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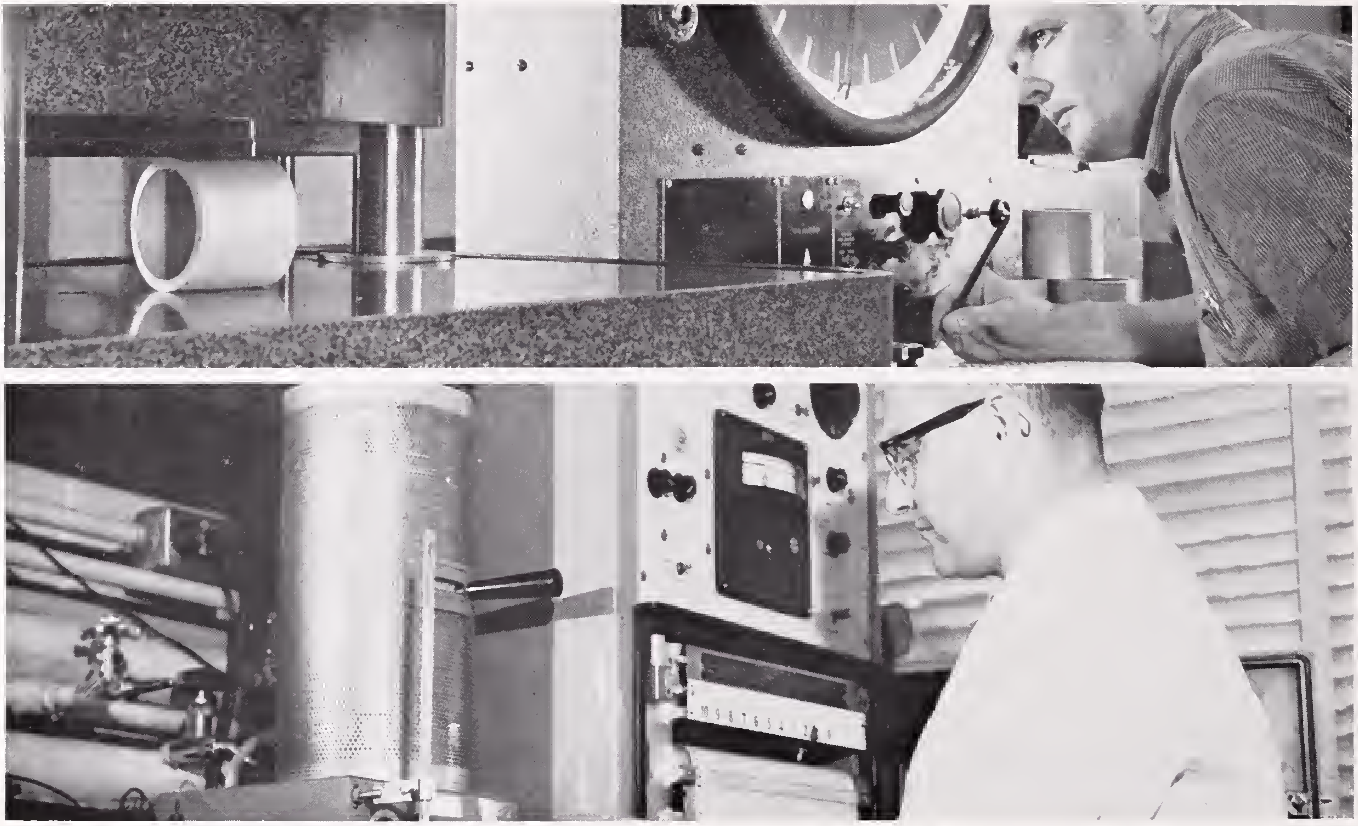

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THE
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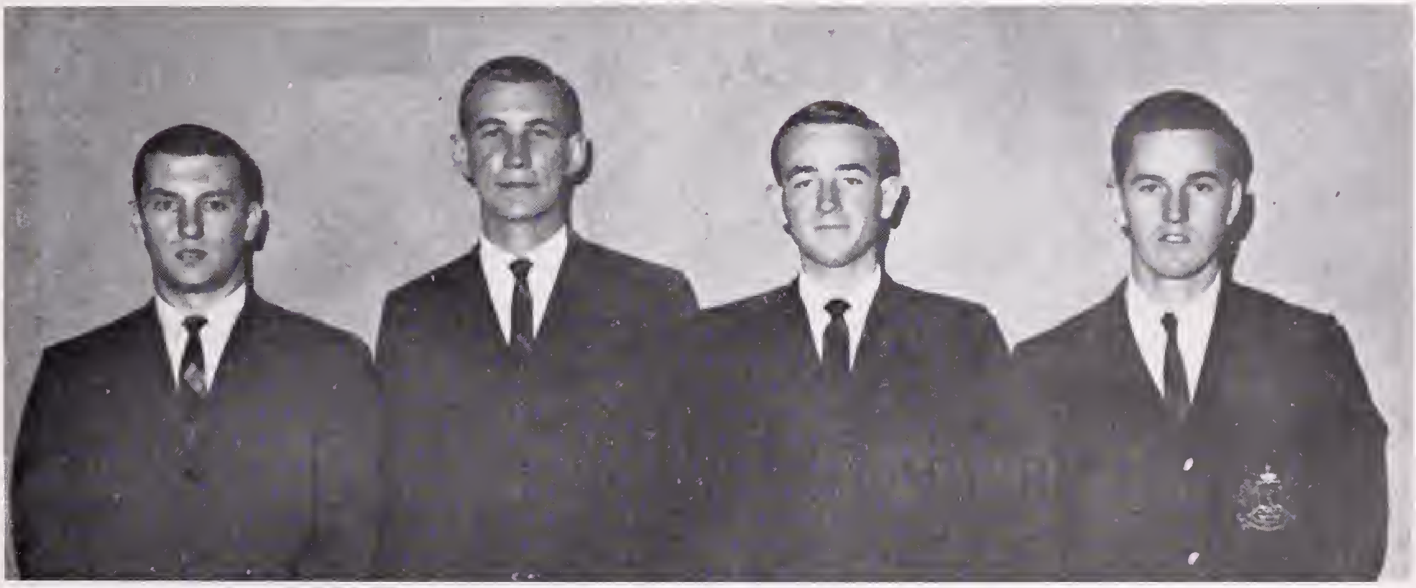
from the Editor

News! This is the theme. Throughout the Fall Issue are items of interest to those here at Clemson and to those in industry. This news is of the past, present, and future. We have tried to bring you up to date on some of the things that have taken place since the last issue.

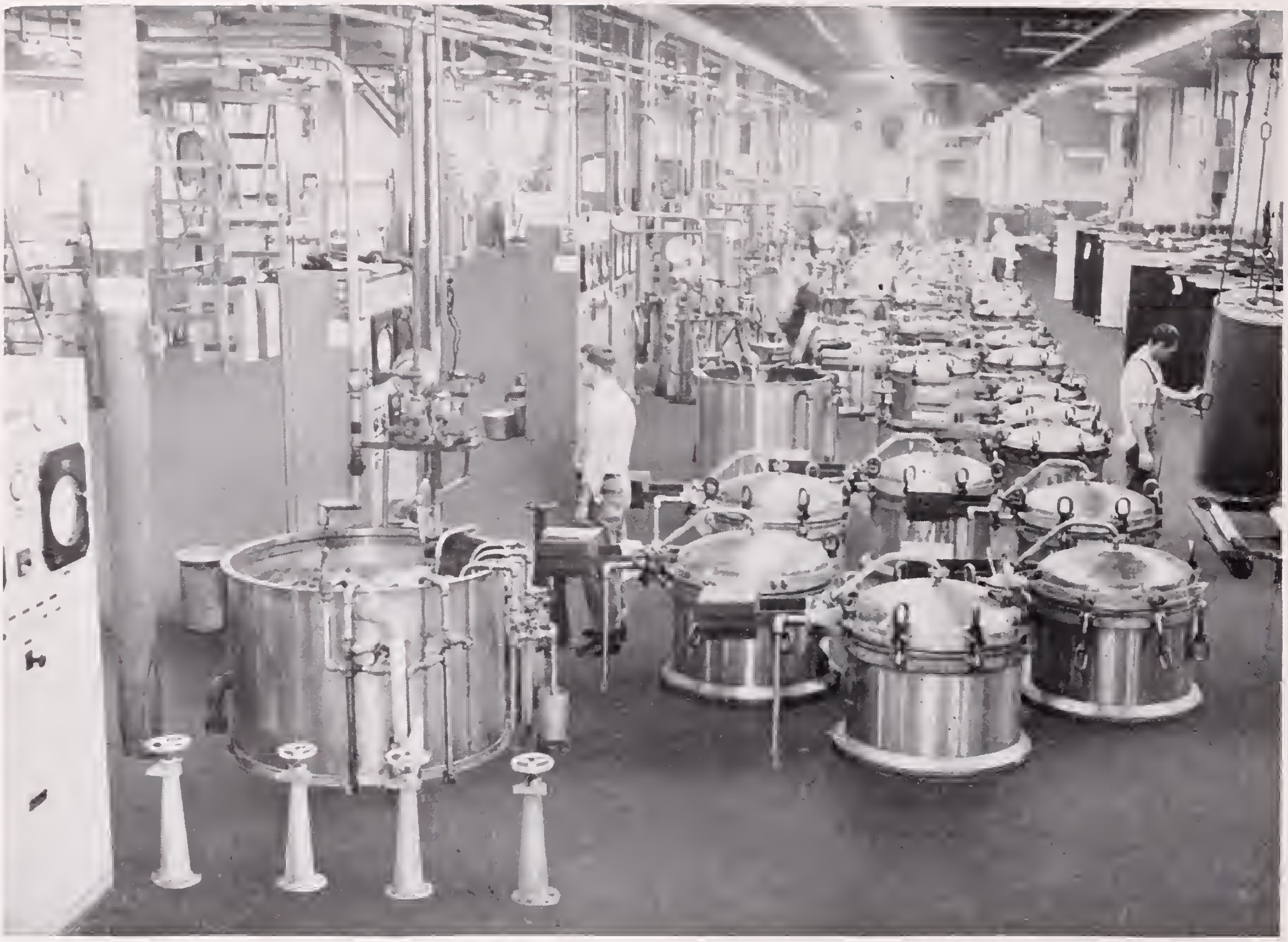
We would like to thank Mr. George Asnip for an excellent article on "What the Industry Expects of the College Graduate."

The staff hopes that you enjoy this first issue of the new school year.

—H. P



Left to right: Wes Connelly, Henry Poston, Marshall White, Bruce Edwards



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What Does The Industry Expect Of A College Graduate

By George Asnip

Biographical Information

Graduate of the United States Military Academy, West Point, New York. Class of 1927. Joined LaFrance Industries in Philadelphia, Pa., November, 1928. In 1938 appointed Sales Manager of LaFrance Industries.

Active duty with the Army 1941-46 in the Ordnance Department — Rank Lt. Colonel.

Joined Pendleton Manufacturing Company and Blue Ridge Yarn Mills as General Manager and Vice President 1946.

In July, 1947, became affiliated with the Deering-Milliken organization as head of the Production Planning and Control Department at Judson Mills. In 1949 was promoted to Plant Manager of the Gerrish Milliken Mill at Pendleton; in 1953 was promoted to General Manager of Laurens Mills and made General Manager of the Worsted Division in 1955. In 1957 was appointed Vice President and Treasurer of Abbeville Mills and the Worsted Division of Excelsior Worsted Mills. In 1960 was appointed President of the Manufacturing Division of Excelsior Worsted Mills and Abbeville Mills. Elected by the Board of Directors of Milliken Woolens, a Division of Deering-Milliken, Inc., as Vice President in charge of manufacturing and sales of all woolens and worsted sold through Milliken Woolens.

Past President of the South Carolina Textile Manufacturers Association; former executive vice president of the National Association of Wool Manufacturers, and a former director of Woolens and Worsteds of America.

A member of the J. E. Sirrine Textile Foundation.

What is the Textile Industry looking for in young men joining us from college today? To answer this, requires a review of the industry as well as a review of managerial qualities needed in the industry. I would like to cover these separately.

The Textile Industry is at a crossroad where it can capitalize on the significant breakthroughs of fiber, manufacturing, and finishing technologies that have been recently made. In addition to these technical strides, there has been a considerable replacement of antiquated machinery in addition to the applications of modern Data Processing administrative techniques. We need men technically qualified to take these breakthroughs further and to fully develop their application. We need well trained minds in all of the academic disciplines. Our needs and the extent to which we can utilize this technological skill are equal to any other industry.

Because the general public is not fully aware of this progress, textile companies and the caliber of their people are often misunderstood and criticized, but the successful operation of textile plants in the South has been the essential building block of the South's industrial growth and diversification. The adage of "success begets success" could never be more pertinently applied. The new non-textile plants springing up around us are proof of the fact that other manufacturers recognize our success. Remember this the next time you listen to our critics.

The textile industry has many things to be proud of; but let me say again that we are at a crossroad. Foreign competition and government intervention is taxing our ability to earn profits justifying continued investment and stockholder support. We have a real job ahead of us.

But you are probably asking yourself, what does this mean to me? Very simply, it is this — because our challenges equal our accomplishments the opportunities open to young men in our industry are comparable or greater than any other industry in our nation and particularly in the South. This leads me to the second part of my subject. — What kind of personal characteristics does the industry need in its management of tomorrow?

The answer to this is so simple that it should hardly have to be given. However experience proves what I am about to say and what others have said before me either hasn't been heard or it hasn't been believed. The acute shortage today of men rising to the top in industry, who are willing to make the sacrifices and to take the risks, validates my case. Unless your age group is made up of a different set of drives, ambitions and character qualities, than some of the age groups preceding you then many of you won't believe what I have to say either. I am sure that last statement is antagonistic, but I have made it to convey my real concern of trends I observe and to hopefully improve your chances for success. This success formula consists of four ingredients — Integrity, Intelligence, Industriousness, and Independence.

Now there is nothing very complex about these four qualities, but again let me say that what ought to be crystal-clear logic seems to have been obscured in this day of the fast buck and compromise for security and the status quo.

So that you don't feel you are being subjected to pious, impractical idealism, let me add weight to my argument by saying I have never known a man who has truly succeeded and kept his self-respect in the process, who wasn't long on all four of these attributes.

Integrity is more than basic honesty or truthfulness. It includes unwillingness to compromise, loyalty to your boss and company, and defending what is right rather than what is expedient. We have been hearing a lot lately that effective politics and — by implication — effective management of human affairs, is "the art of the possible," but often this is cheap compromise. I am not suggesting that effective management doesn't require a melding of separate points of view in getting the best from each contributor. But it isn't taking the most popular course either. Effective organizations aren't run as democracies, and never will be. Every team has to have a captain and popularity is rarely equated with profit.

Loyalty to your boss and company is another basic which often gets forgotten. I am not talking about "yes men" or apple polishing. I **am** talking about pressing for what you believe is best, but after you have had your say and a decision has been reached, then fully supporting it. You will be surprised to find when you enter industry to what extent most companies go in getting opinions and suggestions flowing up the organization structure. But I think you will agree that after all the ideas and facts are in, decisions must be made. If these decisions are contrary to what you think best, ask yourself, if you lacked persuasive skills before you jump to conclusions of being knocked down by an arbitrary autocrat. The thing to remember is that a man of integrity, after a course of action has been chosen, has only two alternatives. To support the course of action or to get out.

Expediency will be a constant pressure you'll face, and I am not minimizing the need for action and results, but most of the bad decisions I have observed have been bad because they were expedient and shortsighted. You will need to continually discipline yourself to look beyond tomorrow to acquire a greater sense of the future if you are going to contribute to minimizing long term problems or failure.

Intelligence is the second characteristic and what do I mean by that? IQ? Hardly!

Some of the most successful business managers I have known would not score exceptionally well on those tests psychologists tell us measure intelligence. Conversely, other men who have disappointed me most, are those who supposedly have all the facts and are completely lacking in judgment. My definition of intelligence includes awareness of what is around you and what is happening. It includes sensitivity to other people's attitudes and opinions. Most importantly it is the ability to deal with basic, proven principles, rather than obscuring the problem with fuzzy edged abstracts.

Awareness of your environment and the people around you is the other aspect of intelligence. Too long businessmen have limited their span of attention to day-to-day physical problems viewed through tunnel vision. Let's say that if all of us don't acquire a greater awareness of these forces, and if we don't make a real effort to deal with them, then our days are numbered when we will be able to do something about our environment.

The third quality is **Industriousness**, and if I wanted to be trite, I could say "hard work never killed anyone" or "a good man is never overloaded," and I know that industriousness or hard work is often equated to the number of hours worked. What I would like to suggest to you is that you find ways in which to do more in **less** time. You all know that it is a rare individual who operates at more than 20 or 30% of his capacity. The task that all of us face is to increase this percentage. While you will have to find ways to personally be more effective in a shorter period of time as management of the future, you will have to find ways in which to motivate subordinates so that they will better utilize their time. Lack of motivation can often be attributed to an individual's lack of purpose or an absence of personal goals.

Many managers used to think, particularly in less affluent times, that money or threatened job loss used to motivate. It is now an obvious fact that what makes a good man tick, and this is particularly true of the better people, is his realization that his work is worthwhile and that he is achieving meaningful results and being recognized for his contribution. For many of you, your first jobs in industry — after some initial training — will be the supervision of production or clerical employees. You will find that if you threaten them or promise them something of temporary value, they will only perform at a level sufficient to avoid pain. But if you lead them in honorable, profitable tasks, you will find them pushing **you** to greater accomplishment than you might think possible. General George Patton had a "famous wet noodle" speech that he gave his officers. He would take a wet noodle in a saucer and prove that the noodle can't be pushed but that it must be pulled. Industrious leadership is getting out in front of your people and committing yourself to the task even more than you are asking them to commit — leading by example, not precept.

Let me say again that the quantitative measure of hours is meaningless. I never measure any of my associates by the hours they work, but by what they get done. The interesting thing is, that the more successful men I have known, appear to work long hours when first assigned to a new responsibility, not only to get the job under control, but to get it running smoothly enough to get into a position where they have more leisure time. Then we promote them and they start all over again.

Seriously, though — while hours worked isn't a valid measurement, too many young men today have taken this principle too far and they appear to feel that there should be a maximum number of hours that an individual should devote to his job. If there is a maximum, I don't know what it is. I do know, however, that this is never a problem with men properly utilizing their time and discipling their energies.

The last quality is **Independence.** There is a need for teamwork when our nation's greatness comes from the concept of freedom of the individual. Freedom to try, freedom to succeed and yes, freedom to fail. Today, we hear a lot about "the Organization Man" and stifling conformity, but no successful enterprise can maintain its position of success without independent men searching independently for new products, manufacturing processes, and sales strategies. There is a need for teamwork when plans have been made and goals set, but if fresh concepts aren't introduced when the next series of goals and objectives are established, then all that is maintained is an existing pattern or plateau of performance.

It is difficult to be an independent thinker. You run the risk of being wrong, you make the sacrifices of possibly being misunderstood and ridiculed. But if you don't keep your independence and your freedom of thought, then what is whatever you gain worth, anyway?

I have covered the four qualities that experience has shown me to be essential to business success. I have stated them in a positive, but I hope not authoritarian terms. Certainly the development of these qualities requires determination, and they leave little room for bending or compromise. They are not particularly comfortable to maintain.

If you find these ideas of mine hold true spread the word. Unless your generation makes more progress than mine has in having these simple truths understood, then there will still be a need for more people endorsing: **Integrity, Intelligence, Industriousness** and **Independence.**

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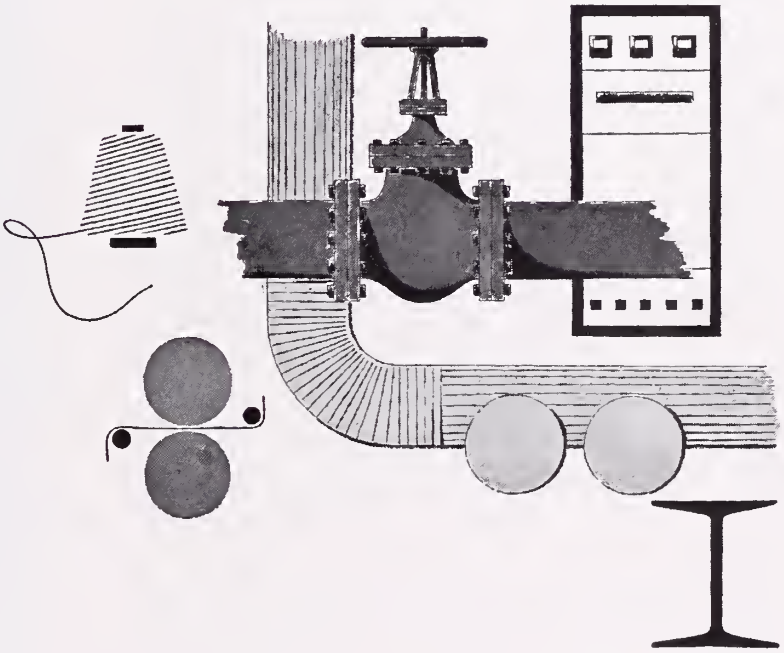

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The curriculum of each student at Clemson majoring in either Textiles or Industrial Management is highlighted by a seminar course that is offered to him. The seminars are offered in two courses. The industrial management seminar is offered to all students seeking a degree in Industrial Management, and the textile seminar is offered to all textile seniors, and all other students (textile and industrial management), the faculty of the School of Industrial Management and Textile Science, research personnel, and any other interested persons.

The speakers are composed of outstanding men of the business world. These high executives are invited to discuss problems of mutual interest with our students. The fields of the businessmen are widespread throughout business and industry. This wide variety allows the student to become acquainted with each aspect of the business world.

It is certainly a privilege for the Clemson student to have such outstanding speakers in his midst. There are very few places one could hear such a group of proven businessmen at such convenience.

The textile seminars are as follows:

September 22nd — Mr. George Asnip, President, Woolen-Worsted Group, Deering Milliken, Inc., "What Does the Textile Industry Expect of a College Graduate?"

September 29th — Mr. J. C. Spangler, Director of Employment, Dan River Mills, Inc., "Recruiting of College Students."

October 6th — Mr. T. E. Stribling, Jr., Senior Consultant, Werner Textile Consultants, Division of Werner Management Consultants, Inc., "Opportunities in the Consulting Field."

October 20th — Mr. W. J. Martin, Cotton Utilization Specialist, United States Department of Agriculture, "The Extension of the Cotton Utilization Program."

October 27th — Mr. M. Earl Heard, Jr., Vice President, Saco-Lowell Shops, "The European Textile Market and International Sales."

November 3rd — Mr. J. R. Garnett, Special Representative, International Business Machines Corporation, "The Application of Electronic Computers to the Textile Industry."

November 10th — Mr. Thomas B. Sain, Executive Vice President, Burlington Hosiery Company, "Research and Development in the Hosiery Industry."

December 1st — Mr. F. S. Love, Secretary-Treasurer, American Textile Manufactures Institute, Inc., "Public Relations in the Textile Industry."

December 8th — Mr. Arthur Magill, President, Her Majesty, "The Changing Pace of the Garment Industry."

January 5th — Mr. W. Stanley Finch, Director of Public Relations and Sales Training, Texize Chemicals, "The Importance of Clear Communication."

The Industrial Management seminars are as follows:

October 15th — Lt. Col. John D. Peters, Assistant DCS/Research, Arnold Engineering Development Center, "The Role of the Military Manager in Military-Industry Contract Relationship."

November 5th — Mr. Harvey T. Stephens, Senior Vice President, Automatic Retailers of America, Inc., "Creative Management."

November 19th — Mr. William C. Laffoday, National Retail Sales Manager, Sears, Roebuck and Company, "Personality Development."

Second semester speakers will be Marion M. Johnson, vice-president, Brown-Forman Distillers Corp., Louisville; John A. Laberee, southern district manager in the extension division of the Du Pont Co., Atlanta; and James F. Lincoln, Chairman of the Board of Directors, Lincoln Electric Co., Cleveland.

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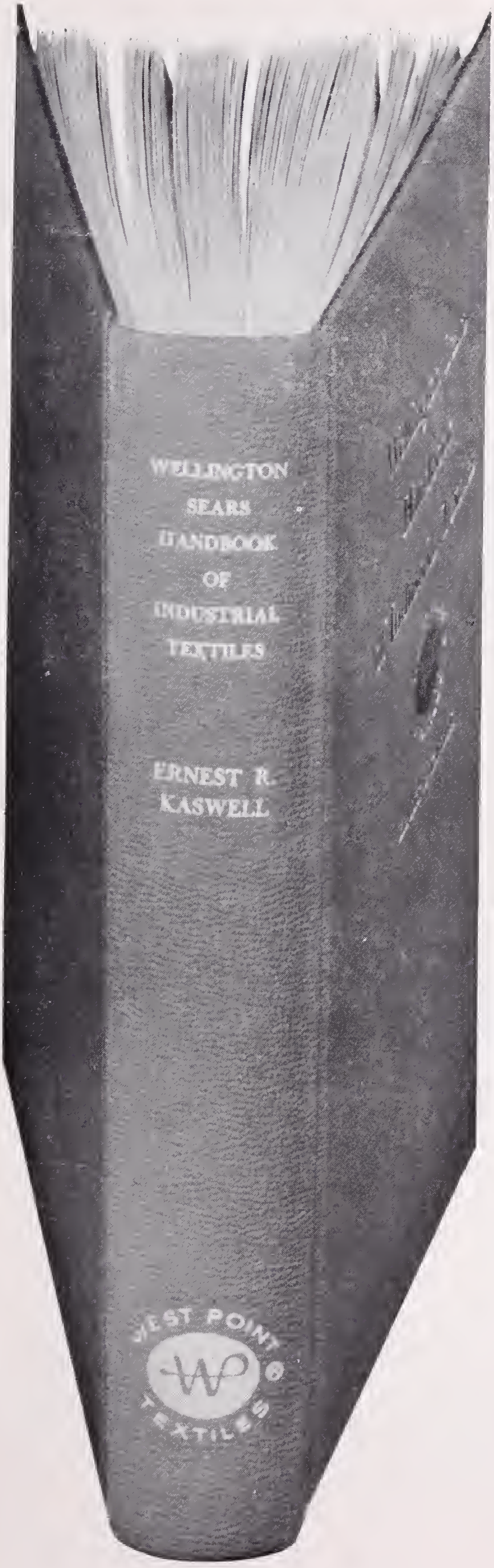

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New Faculty Members

The Bobbin and Beaker staff and the School of Industrial Management and Textile Science would like to welcome three new additions to our faculty.

C. O. SHULER

One new member of the Industrial Management faculty is Mr. C. O. Shuler. Mr. Shuler was born in Aiken County, S. C., and was graduated from Aiken High School. In 1934 he received his B.S. degree in Agricultural Chemistry from Clemson University. He received his M. LITT. degree in Industrial Management in 1951 from the University of Pittsburgh. From 1952 until 1955 he attended the American University in Washington, D. C. He is a candidate for a Ph.D. degree. During 1956 Mr. Shuler attended the Air War College, Maxwell Air Force Base, Alabama.

After finishing Clemson, he worked with Gregg Dyeing Plant, Graniteville Manufacturing Company, Graniteville, S. C. He later joined the Civilian Conservation Corps while it was administered by the Army. Mr. Shuler served continuously, except for a short break in 1946, in the United States Air Force until his retirement in August 1964.

Mr. Shuler is married and has two children; a son who is a freshman at Clemson and a daughter who is a freshman at Daniel High School.

DR. SANG OH PARK

Dr. Sang Oh Park has joined the Clemson University faculty as Assistant Professor of Industrial Management. Dr. Park is a naturalized U. S. citizen. He was graduated from Florida State University in June 1957 with a B.A. degree in economics. In January 1959 he received his M.A. degree in economics from Florida State. Dr. Park received his Ph.D degree in economics from the University of North Carolina in 1957.

Dr. Park has done extended research in the field of economics. He has taught economics at the University of North Carolina, Austin College and the University of New Mexico.

Dr. Park is married and has one child.

DR. S. M. WILLIS

Dr. S. M. Willis is with us again. Dr. Willis returned to Clemson this summer as an associate Professor of Industrial Management.

Dr. Willis is a native of Greenwood, S. C., where he attended public schools before entering Clemson.

He was graduated in 1950 with a B.S. degree in Textile Manufacturing after which he taught at Clemson until 1952. Dr. Willis received his M. S. degree in Industrial Management from Georgia Tech. In 1956 he returned to Clemson where he joined the faculty of the Department of Industrial Management and remained until 1962. He received his Ph.D. degree from the University of Alabama.

Dr. Willis worked for Westboro Weaving Company during 1952 and 1953. In 1962 he was plant manager or Milliken Tetra Pak in Spartanburg.

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THE SECOND MILESTONE

Without question, the first milestone in the development of the American textile industry was the little cotton mill Samuel Slater put into operation in 1792 in Pawtucket, R. I.

But what was the second milestone?

The question will bring all sorts of answers, but many will insist that the honor properly belongs to the brainchild of a man named William Sprague. He is credited with having introduced "possibly the first actual machine in this country to print color onto cloth automatically."

The importance of Sprague's machine was cited in the 1836 publication, "Memoir of Samuel Slater" by George S. White. Mr. White wrote, "Before the commencement of the printing business, the cotton manufacturer was considered in a precarious position, so that no one ventured on the finer fabrics; but since calico-printing has been established, cotton manufactures in the United States may be considered as built on a permanent basis."

Sprague was a farmer in 1808 when he converted a small grist mill in Cranston, R. I., into a factory for carding and spinning cotton yarn by hand. The mill was destroyed by fire in 1813, but Sprague replaced it with a larger, stone building. In 1824, after expanding to another mill south of his first two, Sprague began to bleach and print calico, the first mass production printing operation in the United States.

There is no concrete proof that Sprague's machine was the first automatic cloth printing machine in the country. However, there is no evidence to indicate that it was not. There is no question, however, that his was the first large-scale calico printing effort.

Prior to development of the Sprague machine, American textile printing was a hand operation, although the English had developed an automatic process as early as 1785. By the time Sprague opened his first mill in 1808, English manufacturers had introduced steel-dye cylinder engraving and Manchester, England, was a major center for textile printing and finishing.

The importance of Sprague's machine to the American industry was underscored by the fact that Slater's mill had applied mass production techniques to yarn production and the same techniques affected weaving in 1814 when Francis Cabot Lowell successfully constructed a power loom at Lowell, Mass. These two developments meant that printing became the great production bottleneck as long as hand printing methods remained in use.

* * * *

South Carolina's 344 mills, uncongested and located in rural surroundings, employ some 140,948 people who are receiving an annual payroll of approximately $460,270,287.

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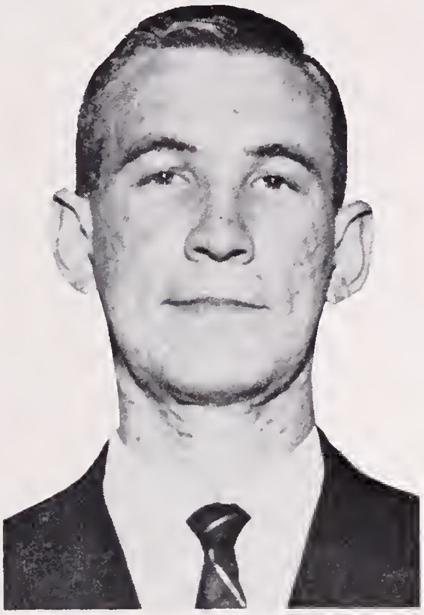

HENRY M. POSTON

Henry M. Poston is a Textile Management major from Johnsonville, South Carolina. He is twenty-one years old and is married. To aid with his college expenses he received a Wellman Foundation Scholarship.

For four summers Henry gained valuable experience in the textile industry by working with Wellman Combing Company in Johnsonville. He worked in several different departments including combing, finishing, carding and methods and standards.

While at Clemson, Henry has been an active member of several campus organizations. This year he serves as Editor of the Bobbin and Beaker and president of Phi Psi, the national honorary textile fraternity. He has also been a member of the American Association of Textile Technology and has received honors for every semester.

After graduation, Henry plans to enter the Army for a two year tour of duty.

George Millon Plyler a twenty-one year old Industrial Management major from Lancaster, South Carolina. He has been an honor student every semester.

This year Millon serves as president of the Senior class and president of the Industrial Management Society. He is also a member of the Society for the Advancement of Management. He is enrolled in Advanced ROTC and is a Distinguished Military Student.

GEORGE MILLON PLYLER

For the past three summers, Millon has worked for the United States Department of Agriculture in Washington, D. C.

After graduation, he would like to attend graduate school in business administration.

Edward T. Samulski, a twenty-one year old Textile Chemistry major, is a native of North Augusta, South Carolina. A Leon Lowenstein scholarship has helped finance his four years at Clemson. He also received an N. S. F. Undergraduate Summer Research Grant this past summer.

Edward has been very active in campus life. He has been a member of the Newman Club, the Young Democrats, the Concert Band, the Chronicle staff, and the Tiger staff. He presently serves as secretary of Phi Eta Sigma and is a member of Phi Kappa Phi.

During the summers, Edward has gained valuable experience by working two summers with United Merchants Seminole Mill in Clearwater, South Carolina and one summer with E. I. Dupont De Nemours at the Savannah River Plant.

After graduation Edward plans to enter graduate school to work toward a Ph. D. in Physical Organic Chemistry.

EDWARD T. SAMULSKI

SIRRINE LIBRARY

In 1956 the Sirrine Technical Library was opened for use. Since that time, the Library acquisitions have grown considerably and each year serves the specialized reference needs of over one thousand students and faculty. It also serves other departments and various textile organizations. The J. E. Sirrine Textile Foundation provides funds for the library, which is operated as a subdivision of the University's Main Library.

To accommodate those who are unable to use the library during the day and to provide a place of study for the students, the Library is open on Tuesday, Wednesday, and Thursday evenings from 7 until 10 p.m.

The present policy of the library is to (1) build up a reference library of mainly technical periodicals and volumes which although having a limited demand, are vitally important to the graduate student and researcher and (2) subscribe to a select number of periodicals which are also held by the Main Library but which are in constant demand by IM and TS faculty and students.

An expanding emphasis on economic and management research and graduate programs, and the constant updating of Courses in Professional Development have created new and additional demands. In response to these new challenges the Library is rapidly acquiring holdings of management and economic journals and periodicals.

As additional graduate programs are developed, the School of Industrial Management and Textile Science increasingly takes on its share of research being done in these fields both regionally and nationally.

The Sirrine Library will continue, as in the past, to play an ever expanding role in the academic achievements coming to fruition in Sirrine Hall.

Some of the recent acquisitions are as follows:

Accounting Practice Management Handbook. By J. H. MacNeill

Accounting Research & Terminology Bulletins. By A. I. C. P. A.

An Accounting Research Study. By A. I. C. P. A.

Introduction to Industrial Management. By F. E. Folts

Organization for Production. By E. S. Roscoe

Preface To Econometrics. By M. J. Brennan

Principles of Management. By G. R. Terry

Principles of Management and Organizational Behavior. By J. O. Longnecker

Uniform CPA Examination Questions and Unofficial Answers. A supplement to The Journal of Accountancy

Handbook of Mathematical Functions. National Bureau of Standards.

Mathematics. Vol. I. 1963. Life's Science Library

On the Accuracy of Economic Observations. By O. Morgenstern

Operations Research Models for Business and Industry. By G. M. F. di Roosaferrera

Quality Control and Industrial Statistics. By A. J. Duncan

Statistical Abstract of the United States.

Economic Almanac. 1964. National Industrial Conference Board.

Finite Mathematics with Business Applications. 1962.

Part Fundamentals: Vol. I., Vol. II., Vol. III. U. S. Government.

THINKING

An electronic brain is the most misnamed thing in the world.

It can't think.

It can recite only what it has been told, and that isn't really being a brain.

It works fast — far faster than the human brain. It can spew its fund of information far quicker than any human typist. It can probably store more bits and pieces of information than the average human mind.

But it can't think.

It can recite only what it has been told.

It can never know the joy of considering a way of doing something and then realizing there is a better way to do that job.

It can never appreciate the quiet satisfaction of adjusting to new conditions to make a job run smoother.

It can never feel the thrill that comes when something is created where nothing existed before.

An electronic brain is pretty in a simple sort of way.

It is fast and precise and always on the job.

But it is just like so many other machines.

It can do only what it is told to do.

The textile industry has electronic brains and other machines. It has jobs for each of them, but they must be told what to do.

That's what people are for.

They can think.

* * * *

Over half of the nation's cotton looms are within a 200-mile radius of Clemson University School of Industrial Management and Textile Science.

an authoritative guide to modern cost-saving and
profit-building methods in the textile industry

SALES AND PRODUCTION MANAGEMENT MANUAL

Practice-Tested Methods and Procedures

By NORBERT LLOYD ENRICK, Ph.D., Associate Professor,
University of Virginia Graduate School of Business Administration;
until recently, Associate Director in charge of Management Services,
Institute of Textile Technology, Charlottesville, Virginia

Over the last fifteen years, Dr. Enrick has served as consultant to mills representing thirty per cent of all spindles in the United States and Canada, including fiber producers, weavers, knitters, and cutting-and-sewing plants. Drawing upon this vast fund of practical experience, he presents here the philosophy and practice of the most modern quantitative methods of management science — using step-by-step procedures, convenient tabular data, and abundant examples and illustrations. He explains in detail methods for more efficient planning, decision-making, and control, not only in textile mill and sewing plant operation but also in marketing, promotion, and merchandising. The result is a book that belongs on the desks of all management, staff, and sales personnel in the textile and needle trades industry.

1964. 191 pages. $7.50.

THE BOBBIN AND BEAKER
School of Industrial Management and Textile Science

SCHOLARSHIPS

Each year the School of Industrial Management and Textile Science is fortunate in having several scholarships to offer to students majoring either in Industrial Management or one o fthe textile courses. Below is a list of all the scholarships and the recipients for the school year 1964-65.

Burlington Industries Foundation — Bobby J. Partridge and David J. Youngblood.

Callaway Foundation — Richard A. Hiles and Tommie W. James.

Ben and Kitty Gosnett — Earl D. McCutcheon.

Leon Lowenstein Foundation — Edward T. Samulski, Marshall White, Bruce R. Edwards, Larry J. Mills, Larry J. Dannelly, and Howard G. Rogers.

Seydel-Wooley — Harry M. Anderson.

South Carolina Textile Manufacturing Association — Mac R. Harley, William M. Sharp, and Chris F. Alexander.

J. P. Stevens and Co. — Bobby L. Waters, Fred M. Hicklin, Roland L. Connelly, and Richard J. Boland.

Sonoco Products — John F. Biggers and Warren S. Perkins.

Ciba Chemical and Dye Company — Charles D. Miller.

David Jennings Memorial Fund — Wilbur W. Connelly and George B. Sproles.

Carolina Yarn Association — Kenneth A. Eubanks.

Allied Chemical Foundation — Frank B. Eaves.

Southern Textile Overseers Association — James J. McKinley.

Chemstrand Corporation — James R. Smith.

* * * *

In 1963, South Carolina's textile mills produced 57.3% of the value of the state's industrial production and paid 60.4% of the state industrial payroll.

Adams
Durst
Harris
Ninety-Six

Plants

Chalmers
Greenwood
Sloan
Mathews

75 Years of Progress
1889 – 1964

GREENWOOD
MILLS

"FABRICS WITH THE
CHARACTER OF QUALITY"

Courses for Professional Development Completes Another Successful Summer

Dr. Wallace D. Trevillian, Dean of the School of Industrial Management and Textile Science, Clemson University, has announced the completion of a very successful summer for the Courses for Professional Development program. This was the seventh summer of the program, designed to keep persons in industry abreast with advancement in science, technology, and management.

During the current summer 87 persons were enrolled in 7 one and two-week courses. These individuals came from several types of industries and represented: 9 states, India, and West Germany; 39 different type job classifications; 62 industrial plants and 39 companies.

Courses offered this summer were Introduction to Textile Manufacturing, Dyeing and Finishing; Yarn Manufacture; Supervisor Development; Methods Analysis and Time Study; Advanced Textile Chemistry; Basic Textile Chemistry; and Quality Control.

Dean Trevillian also announced that plans are under way for the 1965 and 1966 summer programs in Professional Development, and, in each case, an expanded program will be offered, including several additional courses of study.

Any individual or company desiring a copy of the catalog for summer of 1965 Courses for Professional Development should write to Professor C. V. Wray, Sirrine Hall, Clemson University, Clemson, South Carolina. The catalog will be ready in the early part of April.

Shown above is an informal picture of the Professional Development Course in Quality Control. The instructor shown is Professor John M. Wannamaker.

Shown above is a formal picture of the Professional Development class in Methods Analysis and Time Study. Dean Wallace Trevillian is shown third from left front row and Professor Joel L. Richardson, instructor of the course is shown fourth from left front row.

Undergraduate Research Abstracts

In 1962 the "Special Problems" course (IM 403) for all intent and purposes became a course in directed individual research.

A requirement for graduation, this course emphasizes independent investigation on a subject of the student's own choosing and interest. Once a subject is approved the student investigator is largely on his own. At the end of the semester a final manuscript detailing his investigation and conclusion is submitted to the professor administering the course for grading and is then permanently filed in Sirrine Library. Note: During the past year several other alternatives for satisfying this requirement have been approved. One is signing up to play the computer "management game." Others include working on industrial engineering and management problems at local plants and public institutions and working directly under a staff member who is conducting sponsored research.

Editors Note:
With the fall and winter issues, we will publish an abstract of all the undergraduate research papers on file in the Sirrine Library. Thereafter, all abstracts of all papers written in any semester will be published in the next issue following that semetser.

Analysis of the Extent of Use and Benefits of Color, Music and Air Conditioning in South Carolina Manufacturing Industries

T. H. Goodson and J. F. Ousley

Because changing the work environment is an effective means to increase worker productivity, industry is spending more than $2 billion annually on environmental factors such as color, music, and air conditioning.

In preparing our paper, we thought it necessary to present adequate background material where possible concerning these factors in industry in general. Our background material was obtained largely from the Clemson College and Sirrine Libraries.

To determine the extent of use and benefits of color, music, and air conditioning in South Carolina industries, it was necessary to send out a questionnaire and letter of explanation (see appendix) to a representative sample of industries in the state.

The questionnaire was prepared to give the type of industry and its main product, and a place was provided for plant size in square feet and number of employees. In indicating which factors were being used at present, we also asked that it be noted if the factors had been added since construction or were included in the construction plan. If any of the environmental factors had been added since the plant was built, we asked that the motives for the additions be stated.

To determine the benefits gained, each factor was listed separately with space provided for benefits to be listed. We expected improved morale, efficiency, and health of worker to be benefits provided by all three factors and improved machine efficiency a possible benefit in the case of air conditioning. Space was provided so that any other benefits could be listed by the recipient of the questionnaire.

Our questionnaire also netted us information concerning limitations involved in using the factors and the reasons for employing the factor.

A total of 70 questionnaires were returned. From this number, we determined that fifty-five plants use air conditioning, thirty-four plants use a planned color scheme, and fifteen plants use a planned music program.

In addition to sending out questionnaires, we conducted personal interviews with representatives of various manufacturing industries.

We have found that in most instances the use of these environmental factors has proven beneficial to those who employ them.

Our conclusions can be summarized by saying that all three factors, whether used collectively or individually, can improve morale, increase worker productivity, and improve the health of the worker, and where air conditioning is concerned, an increase in machine efficiency can be noted. All three factors contribute to better employer-employee relations.

A Comparative Analysis of Selected Radio Stations in Piedmont North Carolina and South Carolina

M. C. Hughes

The primary objective of this study was to compare five selected radio stations in the Greenville, South Carolina; Asheville, North Carolina; and Charlotte, North Carolina, radio market areas in three major areas of operation: management, programming, and technical factors. The material is arranged in a manner that clearly denotes all current operating characteristics of each of the five radio stations covered in the analysis.

Information appearing in the analysis, with the exception of one nationally published market comparison, was obtained by personal interview with the various station managers and program directors of the stations covered in the analysis. The radio stations included in the study were selected on the basis of relative popularity to various types of listening audiences in the Greenville, Asheville, and Charlotte metropolitan areas.

It was found that, while differing greatly in managerial areas, depending on the size of the station, all commercial stations share similarly basic programming and broadcasting principles. In addition, each of the organizations covered in the analysis subscribes to the Radio Code of the National Association of Broadcasters and is also bound by law in programming and equipmental areas by a set of operating practices prescribed by the Federal Communications Commission. While leaving a large area for individual preferences as to the types of equipment used, all stations share these governmental and associational restrictions and limitations.

Private vs. Public Power: The Case for Private Power

J. M. Burdette and W. R. Ramey

The purpose of this paper is to uncover the facts from the vast amount of data which has been written on the subject of public and private power and present them in a way which would allow one and lead one to make a correct assessment of the two systems.

The process through which our information was gathered ranged through the spectrum of information gathering. Interviews were conducted with private utilities officials; interviews were conducted with public power officials. Printed matter was sought personally of private utilities; printed matter was sought personally of public power officials. Information was acquired through the mails from private companies; information was acquired through mails from public power officials. We searched the college library; we read from the Congressional Record; leading newspapers were read; magazines which print relevant matter were read. The information to which we had access, we feel, was adequate for thorough treatment of the subject.

A comparison of public and private power systems has led us to conclude that the power need of the nation can best be met by private enterprise.

A Study To Determine How The Economy of Clover, South Carolina And The Surrounding Area, Will be Affected By The Establishment of a Division of The Charleston Rubber Company

D. R. Bodie, Jr.

The primary objective of this study was to determine how the economy of Clover, South Carolina, would be affected by the establishment of a division of The Charleston Rubber Company. Major factors of Clover's economy that were analyzed included employment, retail and wholesale sales, real estate, taxes, utilities, banking, agriculture, contractual services, transportation, and education. Methods used in order to obtain information for this study consisted mainly of interviews and correspondence with informed parties.

It was found that the economy of Clover stands to benefit greatly from the presence of The Charleston Rubber Company. Areas that received the greatest benefits were those of employment, retail and wholesale sales, transportation, and utilities. In the long run, the areas of contractual services and real estate stand to prosper. The level of total spending will certainly be increased in the area.

The Growth, Development, Operation and Economic Importance of the Concrete Industry in the Greenville Area

D. R. Folendore

The objective of this report was to determine the economic importance of the concrete industry in Greenville, South Carolina and the surrounding area. The study began with a brief history of the concrete industry, then, reasons for its gowth and development, followed by a discussion on the operation of a modern concrete plant, and finally, an attempt to define the economic importance of this industry.

Most of the material for this report was obtained from personal interviews with key executives in the concrete industry in the Greenville area. A great deal of information was collected from material secured from the Greenville Chamber of Commerce and from library research. Also, a small portion of the analysis came from the author's knowledge of the concrete industry, having worked in a concrete plant in southern Florida for two summers.

Although the concrete industry in the Greenville area is small and does not pour a great deal of money into the Greenville economy, it is nevertheless important. Its importance lies in the fact that it is a necessity. That is, industry coming to the area must have concrete in foundations, columns, sidewalks, and sewage systems for plants; the State Highway Department depends on concrete for drainage systems, medians, and bridges; the people of the Greenville area must have concrete for their homes, driveways, sewage systems, and they also use a considerable amount of concrete for things such as terraces, fireplaces, pools, and walkways.

Private Trucking in South Carolina

Pete Ayoub and Virgil Marlowe

The purpose of this report was to attempt to conclude whether private trucking or commercial trucking is a predominate in South Carolina. This was followed up by a general outlook for the future.

Once concluded that private trucking is predominate, the authors set out to substantiate this choice. In order to better do this, the advantages and disadvantages of both private and commercial trucking were discussed. Opinions taken from questionnaires sent to various industrial firms in South Carolina helped to support and in some cases initiate these advantages and disadvantages. Personal interviews served the same purpose.

In South Carolina, as in the nation as a whole, the use of private trucking has shown a steady increase over the past ten years. Today, approximately 73 percent of the industrial firms use private trucking as compared to 71 percent for the rest of the nation. The future is expected to hold a continued increase in the use of private trucks.

Analysis of Industrial Civil Defense Preparedness in South Carolina

J. C. Caban and B.R. Shillinglaw

In this era of the nuclear weapon it is necessary for our nation to stand prepared for whatever course the future may take. A well-planned nuclear attack could completely demobilize a nation's economy in a matter of minutes unless protection had been supplied beforehand. Therefore, industrial civil defense is a prerequisite for a secure nation. It was this need for protection that inspired our study of industrial civil defense preparedness in South Carolina.

The purpose of this study is to analyze and evaluate the industrial aspects of nuclear survival. The study is confined to industrial firms solely in South Carolina and shows how many such businesses have written plans for survival.

The method used in the study includes three major steps. The first step is a description of an adequate plan of industrial survival within a given plant. The second step is a view into South Carolina's industrial network on a county-wide and industry-wide basis, showing its degree of preparedness. The third step is a description of a plan for post-attack recovery.

The data used in the study were obtained primarily through Colonel Fred C. Craft, Director of the South Carolina Civil Defense Agency.

The basic survival plan described is one developed by the U. S. Office of Civil and Defense Mobilization as a ten-step procedure applicable to any industrial firm.

In the second step, the basis of the paper, the actual figures are revealed. It was found that only 4.4% of the state's industrial firms have made any preparation for nuclear attack. Of all the various type industries in the state, only **Four** were represented by any plan at all. These four are the Photographic Film Industry, The Utility Complex, The Textile Industry, and The Pulp and Paper Industry. The percentage of preparedness of each of these (ratio of number of plans to number of firms) is as follows: Utilities, 27%; Photographic Film, 13%; Textiles, 4.9%; and Pulp and Paper, 3.9%.

In the third step, a description of a basic recovery plan, a procedure to facilitate resumption of production after an attack is discussed. Also, it is found that certain industries have a better chance for survival and recovery than others. Since only four industries have any plan at all, it can be seen from the above figures that the Utility Company has the best chance for speedy recovery. Second would be the Photographic Film Industry, third would be the Textile Industry, and fourth would be the Pulp and Paper Industry.

A general conclusion from the facts in the paper is that South Carolina's industries are poorly prepared for nuclear attack.

The Managerial and Financial Structure of Anderson Memorial Hospital, Anderson, South Carolina

W. B. Hambright and L. E. Wright

The primary objective of this report is to analyze the managerial and financial structure of Anderson Memorial Hospital as a representative non-profit organization and to determine its uniqueness, if any, to that of a comparable size industrial firm that considers profit as its main goal. The main problem faced by the authors was the lack of informative printed material concerning the hospital. As a result, a major portion of the material gathered was obtained by frequent personal interviews, attendance at departmental meetings, and observations within the hospital.

The analysis includes a discussion of the history, managerial structure, financial structure, communications and controls, and changes proposed by management. It is also pointed out that the hospital faces economic and social problems different from those faced by industry.

Based on the information gathered, the authors of this report conclude that there is very little difference between the managerial and financial structure of the subject organization and that of a comparable industrial firm. Speaking in terms of these structures, they only differ in the goals they strive to attain. While the hospital regulates its activities to facilitate patient care and to serve the general public, an industrial firm utilizes the available factors of production in the most efficient manner so as to reap returns in the form of financial profits.

Expansion At Dixiana Mills

Glenn W. Brinson and L. Derrick Grantham

The primary objective of this paper was to analyze the expansions of Dixiana Mills, Dillon, South Carolina, since it began operations in 1954, and on the basis of the results of the investigation, make a predication about expansion in the near future.

The authors analyzed the history of Dixiana Mills from its beginning and the history of Mahasco Industries, Inc., of which Dixiana Mills is a part. This is a part. This investigation also included analyzing the different expansions at Dixiana. The authors made some research in Sirrine Library about the carpet industry as a whole.

Based on information gathered about Dixiana Mills, Mahasco Industries, Inc., and the carpet industry as a whole, the authors of this paper predict that Dixiana Mills will have to expand again by 1970 to meet the anticipated demand for tufted carpet.

An Analysis of the Alternative Uses of the Donaldson Air Force Base Complex After the Move of the Base from Greenville, South Carolina

Grady L. Ballentine and Gerald L. Stafford

The primary objective of this study is to make an analysis of some of the alternative uses of the Donaldson Air Force Base complex after the move of the base from Greenville, South Carolina. A background of the base and the events leading up to its final deactivation are included to show that Donaldson has in actuality been a temporary base since its deactivation in 1942.

The data for the study were gathered by personal interview, personal observation, and library research. Information was also obtained from correspondence with companies and organizations interested in locating at Donaldson. Because of the existence of very strict government channels, the United States Air Force did not provide any data requested from it.

Two significant findings were made in this report. First, from a review of the history of the base and the events leading up to its final deactivation, it was evident that in actuality the base has been a temporary one since its activation in 1942.

Second, it was found that the base could not be economically utilized singularly for any one specific purpose other than as a military airbase. Therefore, maximum utilization for the base complex would be achieved if it were divided up and used for different purposes. A multi-purpose plan for the most efficient and economic utilization of the existing facilities is recommended.

International Controls in a Textile Finishing Plant

Barry N. Bolding

This paper is an analysis of the internal controls employed in a representative textile finishing plant. The analysis begins with the definition of internal controls as here used. The problem is defined and proposed methodology is stated. From here, the analysis progresses to a complete discussion of the plant itself, its history, status, organizational structure, and the internal controls used. An analysis of internal control theory is then given and from these two a comparison between the practice and theory is made to determine the relative merits of the organization's internal controls. This comparison shows very favorable conditions exist in this organization in a practice-theory relationship. In conclusion it is seen that the analyzed firm follows all the acceptable theories of internal controls and adheres to these at all times unless the situation demands otherwise.

A Quantitative Economic Comparison of the Compact Car Versus the Comparable Conventional Model in the Greenville Area

Jerry N. Brooks and Ralph H. Ward

In this project the authors wanted to determine whether a compact car was actually more economical than a conventional model in the same price range. One of the major problems in determining the answer to this question lay in the bias information provided by the three major automobile manufacturers. To circumvent this the authors conducted a consumer survey in the Greenville area and also personally interviewed insurance companies, finance companies, tire companies, and automobile dealers in the Greenville area.

There were five major topics on which the comparison of the two models was based: initial cost, including equipment on car, maintenance costs, comfort and styling, safety factors, and resale value. In addition, other factors which the authors considered relevant to the comparisons were also included.

The results of the comparison in all three major sections showed that in the overall comparison the compact car was more economical than its conventional counterpart. The only factor in each comparison which strongly disfavored the compact model was in comfort. In each discussion the compact was sadly lacking in interior roominess and riding comfort in comparison with the conventional model. This factor proved to be the major one which kept many people from buying compacts. Surprisingly enough, there was not a tremendous difference in the gas mileage of the cars which were compared in the survey. The largest difference was only 2.1 miles per gallon when the authors considered the average gas mileage of each car in the comparisons. In the categories of initial cost compared to equipment, styling, and resale value, the compact had tremendous advantages over the conventional models. There was no noticeable difference in safety factors of the second car problem of most American families. The compact is definitely not a family car due to its small size and lack of interior room. It is the authors' opinion that the compact car is ideally suited for a young couple or a a second car in a family which also has a conventional model. The compact has its place in the American economy and although it has its limitations, it has become an integral part of the American way of life.

An Analysis of South Carolina's Technical Education Program

James F. Carter and John S. Tharpe

The purpose of this research paper is to analyze South Carolina's new technical education program, and its predicted effects and ramifications. The vast industrialization of the state and the low educational and industrial inadequacy are presented in the paper The structure, costs, legislation, and curriculums of the system are also presented. The TEC program is a progressive one that offers excellent curriculums, instruction and facilities to qualified persons. The low tuition and general excellence of the program privides almost unlimited opportunity for TEC students. We conclude that the technical education system will be a great attraction to industry and a cultural and educational benefit to South Carolina citizens.

Absenteeism in the Textile Industry of South Carolina

James L. Coggins and Robert E. Scott

This study relating to absenteeism was made for the purpose of obtaining useful information concerning the reasons for, conditions affecting, and variances of absenteeism. In the beginning it was intended to rely solely on information derived from textile plants of south Carolina, but it was found necessary to supplement this data with other data derived from textile plants of South Carolina, but it was found necessary to supplement this data with other data derived from periodicals and other such sources.

The paper treats the subject in seven major sections plus an additional section headed Supplementary Findings. The seven sections are:

(1) Introduction
(2) Predominant Reasons for Absences
(3) Variance of Absenteeism in General
(1) Variance of Absenteeism Rate Within the Plant
(5) Conditions Affecting Absenteeism
(6) Results of Absenteeism
(7) Conclusion

The first section is concerned with an introduction to the subject of absenteeism. Here, absenteeism is defined and the methods used in obtaining data are discussed. The next five sections are a detailed discussion of the problem of absenteeism limited by these five headings. Section VII concludes the main body of the paper. Included after the conclusion is the section on Supplementary Findings. This section contains methods of controlling and handling absenteeism thought worthy of mention by the authors.

The Possibilities of Establishing a Structural Clay Products Plant in North-West Florida.

Jesse B. Edwards

A study was made to find out if it is feasible and practical to locate a ceramic plant in Northwest Florida.

Information was gathered by written request and personal interviews with people in the ceramic industry and with people and organizations interested in the industrial development in the state.

It was found that there is a definite market for brick and tile and that the concrete block industry is firmly entrenched in the area. The supply of labor for now and the future is more than adequate. Labor laws favor neither labor nor management but are provided to protect both labor and management and to aid them in any way possible. Wages are lower than the national average but all classes of labor are available.

Taxes were found to be no more than those in other states and in many cases are less.

Fuel for power is available at special rates for industrial use. The power furnishing capacity has always been kept ahead of demand. Water is very abundant and is found in a very pure form in most cases.

Transportation was found to be acceptable with a good road and railroad network. Trucking is a rising industry in the state.

Clays were found to be in existence in the considered area and in sufficient quantity but were spread out in small pockets which would mean an extremely large investment in land. The clays are of the correct type and problems encountered in using them in the past have been remedied by modern processes.

It is recommended that the plant not be located in this area unless adequate clay is found at the right price.

Parr Nuclear-Fired Generating Plant and Its Economic Aspects

Coleman O. Glaze and Thomas H. Waughan

The reason that this study was undertaken was to find out the motives of the Carolinas Virginia Nuclear Power Associates in building the Parr plant.

We looked into many aspects of the plant. We studied plant construction, plant location, safety, and employment in the plant. We also looked into the role that the government played through the Atomic Energy Commission.

The reason that the plant was built, as far as the Carolinas Virginia Nuclear Power Associates was concerned, was to study nuclear power and its application in the power generating business. The project is a non-profit making one, and the associates will receive little financial return on their first investment.

At the present time, it is not economically feasible to use nuclear power for the needs of its customers.

The associates are made up of the following companies: the Duke Power Company, the South Carolina Electric and Gas Company, the Carolina Power and Light Company, and the Virginia Electric and Power Company.

The Growth and Development of the Paper Industry In the South and its Future Potential

Russell B. Hebert, Jr.

The purpose of this paper is to give a better insight into the paper industry in the South, and just what it can do and has done for Southerners. It is hoped that the individual Southerner reading this paper will come to realize the vast potential of Southern timber-land resources. The future of the South depends on this realization.

In gathering information for this paper, the personnel of several paper mills were interviewed, individual land owners were talked with, home offices of paper companies were contacted, along with the Clemson Extension Service, and additional research was done in the Clemson University Library.

Some important findings realized from this research are: the South has increased wood pulp output of the total production in America from ten percent in 1920, to over fifty percent in 1963; there are now mills in every Southern state except Kentucky, and these mills consume ninety-seven billion dollars worth of pulp wood annually from Southern forest and provide a total payroll of over sixty million dollars; the paper industry is the fifth largest industry in the nation, and surprisingly enough, seventy-five percent of all Southern woodland is in the hands of private ownership.

There are unlimited opportunities for Southerners in the South, if they will only realize that the color today is green, and that through proper timberland management, they can grow and prosper with the paper industry and the South.

The Tennessee Valley Authority in Theory and Practice

Robert Lewis Johnson

There are three problems to be analyzed. The first problem is to see if TVA operations today are in accordance with what TVA was set up to do as set forth in the TVA Act of 1933. The second problem is to see if the TVA is paying its own way. That is, are revenues exceeding costs? Problem number three is to see if the 152 retail distributors of TVA power are showing a fair return on their investment.

The following conclusions were drawn from information obtained from the Tennessee Valley Authority, the Electric Power Board of Chattanooga, the Knoxville Utilities Board and library sources. First, TVA operations today are in accordance with what it was set up to do as set forth in the TVA Act of 1933. Second, the Tennessee Valley Authority is paying its own way — revenues are exceeding costs. Third, the 152 retail distributors of TVA power are showing a return on their investment, but this percent return on net investmment has been declining since 1947.

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Kotton Korner

An Englishman returned home from a trip to America, and was telling his friends about one of the queer American games he saw played at a carnival.

"It is called 'Ohhell", he explained.

"Ohhell?" asked his friends. "How do they play it?"

"Well, you pay a dime and you get a card. Then a man calls out a lot of numbers and after a while someone yells "Bingo." Then everyone else yells "Ohhell".

* * * * *

Student (to clerk in bookstore), "How much is this paper?"

Clerk: "Seventy-five cents a ream."

Student: "It sure is."

* * * * *

Mrs. Cothran: "That new washwoman has stolen two of our towels."

Ed: "The thief! Which ones, dear?

Mrs. C: "The ones you got from that motel in Sarasota."

What's the matter with your finger, Harry?

Oh, I was downtown getting some cigarettes yesterday and some clumsy fool stepped on my hand.

* * * * *

The chemistry professor was giving a lesson on the explosive qualities of different chemical compounds.

"This," he explained, "is one of the most dangerous explosives known. If I am in the slightest degree wrong in my experiment we are likely to be blown through the roof. Kindly come a little closer, so that you may follow me better.

* * * * *

The temperance committee heard of a man ninety-five years of age who had never tasted alcoholic beverages, and rushed to his bedside for a testimonial. While they were guiding his trembling hand along the dotted line, an awful commotion arose in the next room.

"What in the world is that?" asked one of the good ladies.

"Oh, that," gasped the old man as he sank back on his pillow.

"That's my Dad. He's been drunk for a week."

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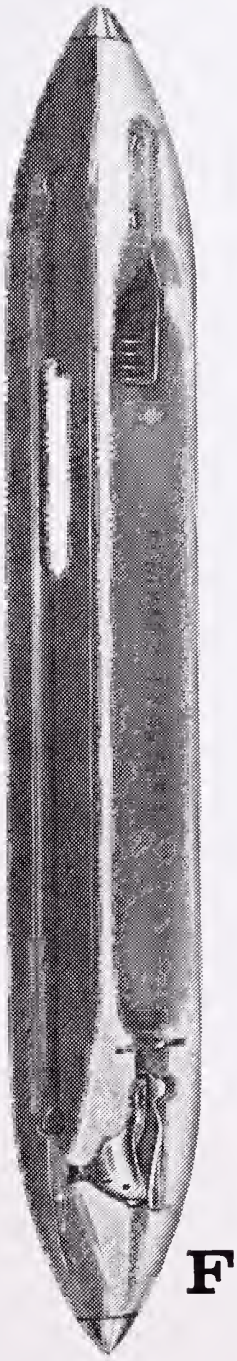
What's going on at FLETCHER SHUTTLES?

(They're having growing pains)



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But some folks think this growth means we're now neck and neck with the big fellows. We're not. We're still only third in the Big 3.

It's just as well that we face up to it. When you're only third you don't become self-satisfied.

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Shuttle Parts.

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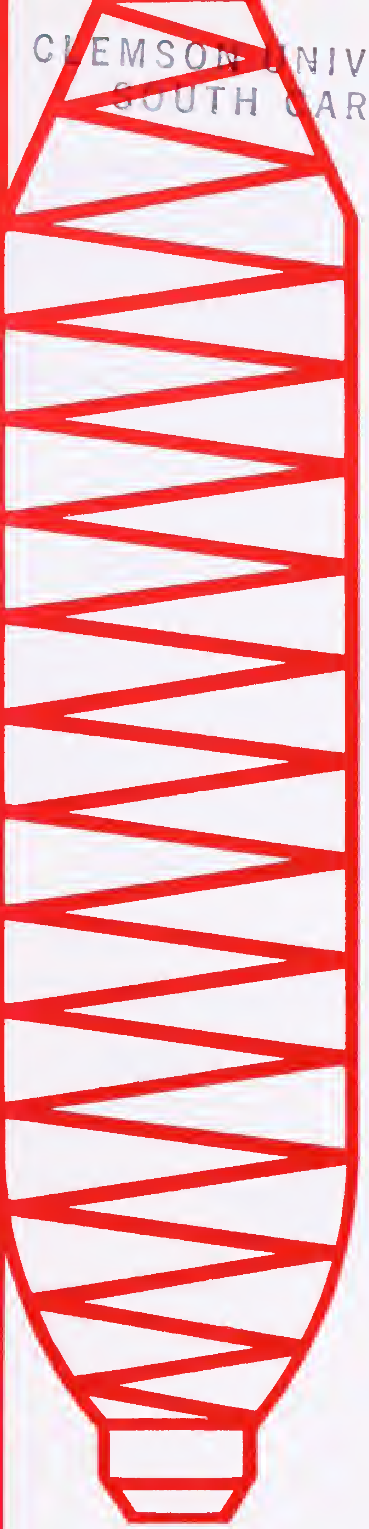
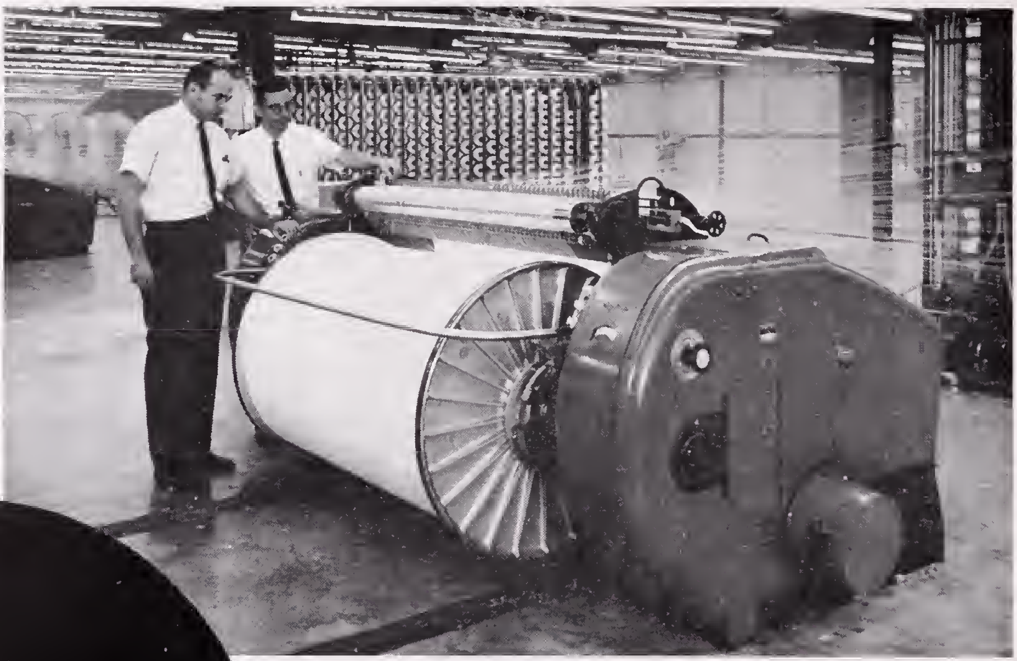


Bobbin & Beaker

CLEMSON UNIVERSITY

WINTER ISSUE 1964

One of the
BW-40-C Warpers
in the new
Beattie Plant,
Woodside Mills
Fountain Inn, S. C.



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Larger Beams This BW-40-C Warper will produce beams up to 40" diameter.
Operating Convenience All work is easily accessible — a valuable feature when running cottons at high speeds.

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THE
Bobbin & Beaker

Official Student Publication
Clemson School of Industrial Management and Textile Science

VOL. 22 WINTER ISSUE 1964 NO. 2

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from the Editor

This issue should contain something of interest for all of our readers. We have two excellent articles by faculty members and one by Dean Wallace Trevillian. Dean Trevillian's article is concerned with industry and education, while Professor Gentry's article is entitled "Electronics in Textiles", and Professor Wannamaker's is "Accounting—A Useful Tool of the Modern Manager."

The Bobbin and Beaker has always been distributed free to anyone who desires it, and we hope that we can continue with this policy. However with the rise in cost of printing, the cost of mailing, and other costs necessary to publish this magazine, each issue costs more than the previous one. To avoid additional expense of postage on issues returned due to addressee having moved without notifying us, please notify our circulation manager when you change addresses.

The staff would like to take this opportunity to wish each of you the very best in the new year.

Left to right: Wes Connelly, Henry Poston, Marshall White, Bruce Edwards

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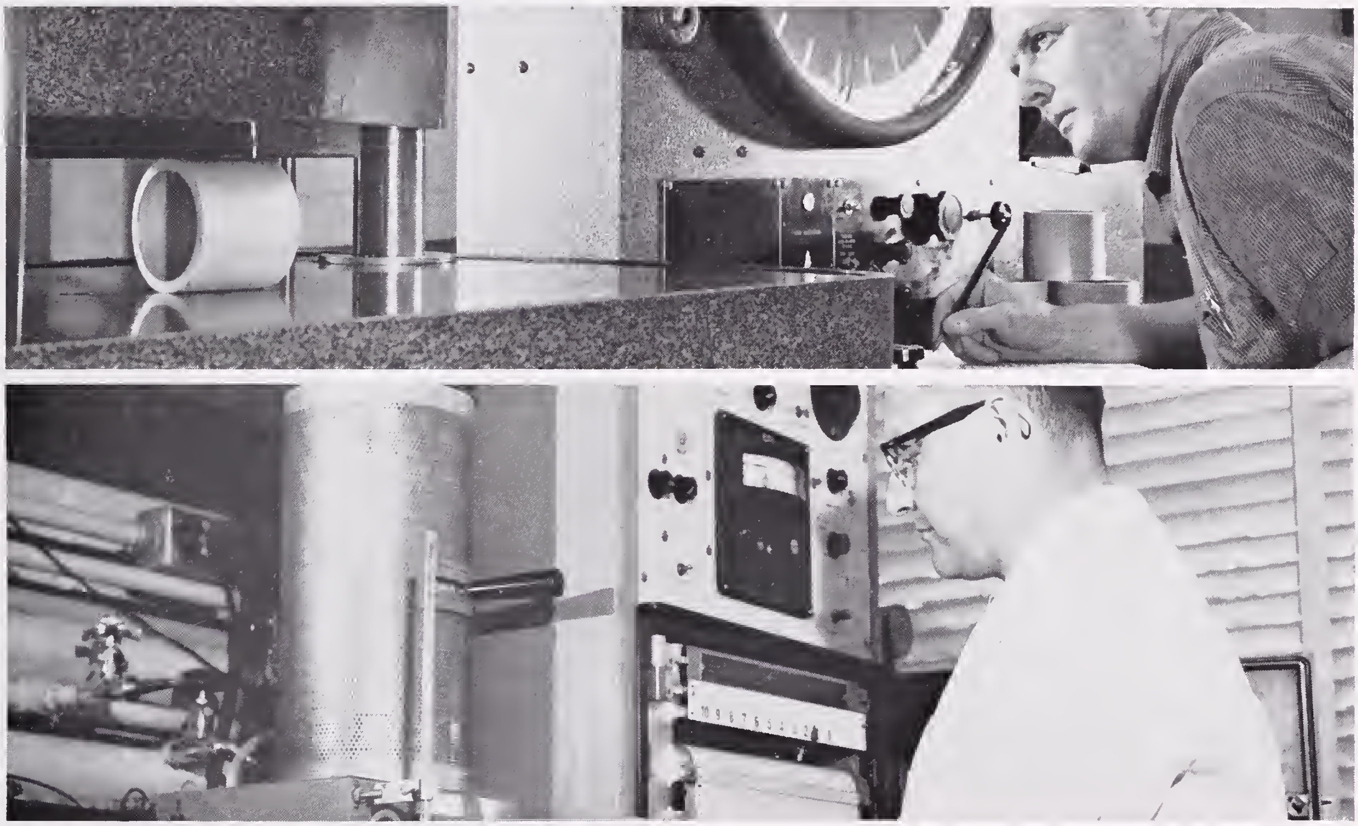

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Electronics in Textiles

By Asst. Prof. David Gentry

BIOGRAPHICAL SKETCH

Mr. David R. Gentry is an assistant professor in the Department of Textiles. He teaches Physical Textile Testing.

Mr. Gentry is a native of Easley, South Carolina. He received his B. S. degree from Clemson in 1955, and in 1957 he received his M. S. degree from the Institute of Textile Technology in Charlottesville, Virginia.

Before becoming a member of the faculty of the School of Industrial Management and Textile Science, he worked for 2½ years for the research division of the Westpoint Manufacturing Company of Westpoint, Georgia. He is presently doing research in the field of textile testing here at Clemson.

The development and perfection of electronic circuitry and equipment has had considerable impact on industry, and the textile industry is no exception. Forward thinking research people have applied electronics to textile problems and manufacturing operations. Industry management has in many instances accepted such developments immediately and has benefited considerably from their application.

Electronic apparatus has found application in three areas: testing instruments, processing aids, and control systems. Testing instruments, of course, are used for the measurement of material properties with notable developments having occurred in the evenness testers and strength testers using strain gage principles. Instruments have also been developed for electronically measuring fiber length and color and even for measuring trash content of cotton. Processing aids include such items as meters for continuous monitoring of moisture in yarns and fabrics, yarn tensioning devices, slub catchers, and yarn defect detectors. Control systems are used for automatically controlling some process variable, and those systems most commonly found in textile processing are moisture controls for drying ranges, warper drive controls for providing constant winding speeds, size-box level controls for slashers, and pH controls for wet processing.

PRINCIPLE OF ELECTRONIC MEASUREMENTS

One basic principle characterizes all electronic measuring systems and is outlined in Figure 1. The first requirement is to have a sensing device which is affected in some way by the property being measured. Following this device must be an amplifier or other modifying element which converts the variations in the sensing device to a usable signal. Third, there must be an output of the signal with this output being fed into a meter, recorded on an oscillograph, or actuating some device which controls some operation.

SENSING ELEMENTS

There are several types of sensing devices used, and these are outlined in Figure 2. A very common meth-

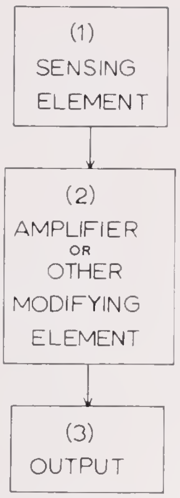

Figure 1
Principle of Electronic Measuring Systems

od for detecting property variations is to measure the change in the capacitance of an electronic circuit caused by introducing the material being measured between the plates of a capacitor. This type of sensing device has been used extensively in the newer evenness testers and instruments for measuring moisture content.

A second class of sensing elements include resistance bridges, reactance bridges, and differential transformers. The bridge type transducer consists of a Wheatstone bridge with one arm of the bridge becoming unbalanced with the sensing of the property being measured. A resistance bridge, of course, measures properties which affect the resistance of a circuit while a reactance bridge differences in reactance of a circuit.

The differential transformer transducer is a very important type with a schematic being shown in Figure 2. It consists of a hollow device which may be mounted on a stationary member of some apparatus and a core which fits inside the hollow tube and is mounted to a movable member. Contained in the hollow device are primary winding coils which are energized and two sets of secondary windings. The motion of the iron core imparts an excitation voltage to one of the two secondary coils and the magnitude of the electromotive force generated depends on the degree of motion of the core. Thus a signal is generated which is directly proportional to the mechanical movement of some member of a apparatus.

A third type of sensing element is the strain gage. This element is very similar to a resistance bridge transducer except that a physical movement of one of the bridge arms is caused by variation in the property being measured. This increase in length (strain) causes a change in resistance of the arm and unbalances the bridge, generating a signal which is proportional to the strain. This sensing element is most often used on tensile testing apparatus.

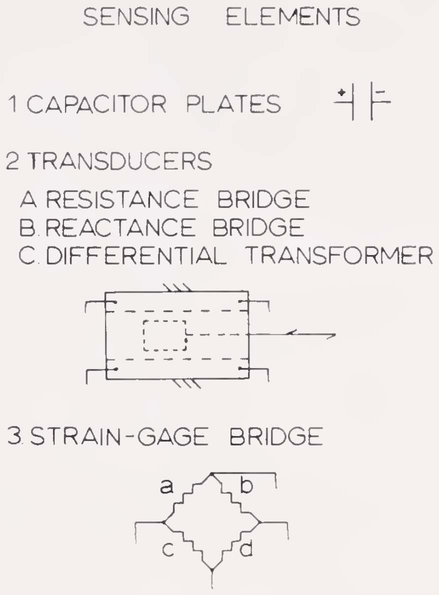

Figure 2
Various Types of Sensing Elements

REQUIREMENTS FOR SENSING ELEMENTS

A good sensing element must meet a number of requirements. First, and most important, it should have good repeatability. Repeatability is defined as the ability of an instrument to reproduce the same output while approaching the same calibration point from the same direction. Second, the sensing element should be linear; that is, it should produce a signal proportional to the measured variable. There should also be a minimum effect of temperature since variations in temperature often affect zero shift, sensitivity, and linearity. The sensing element also should have a minimal hysteresis effect and be as frictionless as possible.

Most sensing elements are accurate to one percent, but in many cases, this degree of accuracy is only a rough approximation. Quite often, it is necessary to locate transducers in areas of extremely undesirable conditions such as heat, cold, liquids, and vibrations. Thus, they must be rugged and unaffected by their environment. Unless a sensing element picks up a clear signal that is true with accuracy and precision, then further operations of an electronic system are practically useless.

APPLICATIONS IN TESTING INSTRUMENTS

Now for some specific applications of electronics in textiles. By far, the greatest use has been in the area of testing instruments with a notable application having developed in evenness testers. Evenness is defined as the variation in weight-per-unit length of a strand of material. Two types of variations are involved and are known as long-term and short-term variations. Long-term variations are variations in long lengths of materials (usually 100 times the fiber length and longer) while short-term variations are variations in short lengths (one to ten times the fiber length). The Brush evenness tester was developed specifically to measure these short-term variations.

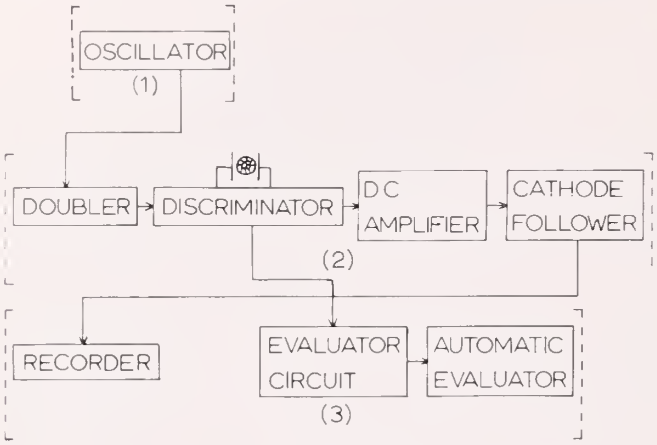

Figure 3
Block Diagram of the Brush Evenness Tester

A block diagram of the tester is shown in Figure 3. The first stage of the instrument is an oscillator which changes DC voltage into a periodically charging wave form. Oscillators can change frequency from 2 cycles per second to 10 million cycles per second or more. The Brush sets up oscillations at 3.75 megacycles. Next in line is a tune plate-tune grid doubler, and as the name implies, this stage doubles the frequency of oscillation to 7.5 megacycles. It's primary function is to energize the F.M. discriminator. The discriminator contains a capacitor (the sensing element) in its circuit through which a continuous strand is passed. The initial introduction of the strand between the plates of the capacitor produces a change in capacitance in the circuit. Since weight per unit length of the material directly influences the capacitance, the strand is simply pulled continuously through the sensing element thus causing variations in the capacitance which are proportioned to variations in the weight per unit length. These changes in capacitance cause frequency modulations which are converted into voltage variations, and therefore voltages result which are proportional to variations in weight per unit length.

The signal from the discriminator is fed to a DC amplifier which simply amplifies and refines the signal for use by the recorder (or other output receiver). This signal is fed through a cathode follower whose purpose is simply to match the amplifier signal to the recorder.

An alternate output system is one in which the signal from the discriminator is fed to an evaluator circuit and an automatic evaluator. This circuit picks up extreme signals (high and low) in a 10-second period and carries a running average to the automatic evaluator containing two meters. The nominal percent nonuniformity (%NU) meter varies with the short-term variation while the fiducial mean meter measures long-term variation.

Another testing instrument is the Custom Scientific Instrument Company's cohesian tester. A schematic and block diagram of this instrument is shown in Figure 4. Basically, the tester consists of two sets of drafting rolls which attenuate a strand of sliver or roving with the delivery rolls being mounted on a cantilever. Cohesian of the strand causes the delivery rolls to be displaced toward the feed rolls. The core of a differential transformer is fastened to the delivery rolls and is displaced inside the hollow chamber. This displacement causes variations in electromotive force which are sent to an appropriate amplifier and recorder. In this fashion, a property causes a mechanical motion to develop and this mechanical motion is converted to electrical energy.

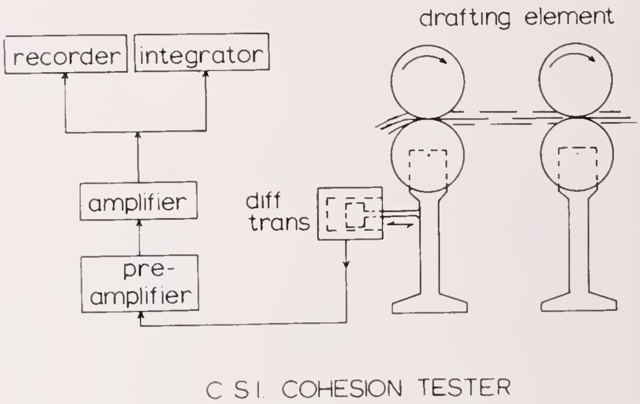

Figure 4
Schematic and Block Diagram of the CSI Cohesian Tester

CONTROL SYSTEMS

A surprisingly large number of automatic control systems are used in textile processing. In fact, many of them are not electronic but are entirely mechanical as exemplified by dobby chain mechanisms on looms. Others used are hydraulic in nature and many are combinations of two or more of the various types. There are generally five levels of control systems and these include

(1) single-loop control,
(2) unit control operation,
(3) automatic process,
(4) automatic plant, and ultimately
(5) an automatic business.

Most control systems are the single-loop control type with a great deal of sophistication being required for the automatic control of processes, plants, and businesses. In addition to the technical limitations, economic considerations enter in to the level of control because any operation can afford only a limited amount of new engineering and development work.

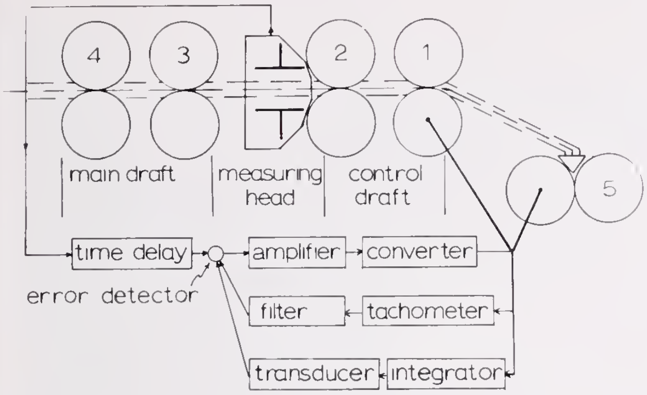

Figure 5
Schematic and Block Diagram of the Saco-Lowell ADC Drafting System

SPECIFIC CONTROL SYSTEMS

Figure 5 shows a control system applied to the drafting element of a drawing frame. This system is one which has been developed by Saco-Lowell and the Uster Corporation for the specific purpose of reducing short-term variation in sliver resulting from the various drafting processes encountered upstream from this point in the processing organization. Basically the system consists of Uster electronic measuring equipment which is similar in principle to the electronic evenness tester previously described. As the sliver enters the sensing element, a signal is produced which is proportional to the weight per unit length of the sliver. This signal goes to a time delay circuit and from there to an error detector. A tachometer-generator supplies a signal from the front roll (No. 1 in the Figure) to the error detector as does the constant rpm roll. These signals are compared with each other, amplified, and sent to a magnetic converter which regulates the control gearing. The control gearing regulates the front roll speed to lengthen heavy places or shorter light places, thus leveling variations in weight per unit length.

The range of draft in the control zone is 1.1 to 1.5, providing an adjustment of ± 20% from the reference mean. It should be readily apparent that the time-delay is necessary to allow the measured sliver to move into the control draft zone where the appropriate drafting action can be taken.

Long-term variations are compensated for by the use of an integrator and transducer. The integrator "remembers" the average level of sliver weight, and deviations from this level activates a transducer which sends a signal to the error detector and this increases or decreases the front roll speed.

This system in reality is a very sophisticated one employing two feedback control systems to eliminate a short-term as well as long-term variations in weight.

An example of a control system which is widely used is the General Electric Thymotrol warper drive shown schematically in Figure 6. The purpose of the system is to provide a constant winding speed for the warper. In this application, the sensing element is a compress roll which rides on the surface of a warper beam. As the beam becomes larger in diameter as a result of winding yarn onto the beam, the compress roll turns faster. This faster-turning roll causes a tachometer generator to feed a signal to an electronic control circuit (E.C.C.) Thyrotron tubes in the electronic control circuit then cause a proportionate variation in power to be applied to the DC drive motor (M) through the power supply circuit (P.S.C.) The change in motor speed resulting from the decreased power slows the beam down to its original surface speed. The changes in speed brought about are instantaneous, smooth, and stepless.

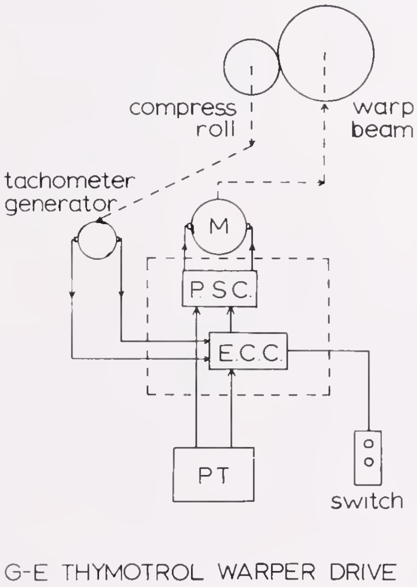

Figure 6
Schematic and Block Diagram of the G. E. Thymotrol Warper Drive

SUMMARY

In summing up what has been presented, it should be apparent that electronic applications in the textile industry are by no means an end within themselves. Quite often, the task accomplished could be accomplished mechanically or by other means. However, electronic applications have assumed a role of great importance and are performing a tremendous service for technologists and management, enabling both groups to perform their tasks much better and more efficiently.

IMS RE-ORGANIZES

By James Smith, IM '65

During the latter part of second semester of the 1963-64 school year the Industrial Management Society elected new officers. Attendance at the last three meetings of the year consisted of the newly elected officers, President, Millon Plyler; Vice President, Jimmy Smith; Secretary, Jim Jensen; Treasurer, Bobby Partridge, Historian, Butch Moss; the faculty Advisor, Mr. John Wannamaker, and a couple of stragglers. It was apparent that something had to be done to keep the club from sinking into oblivion.

The new president and vice president began searching for something to put the club back into prominence on the Clemson campus. After several long consultations and correspondence during the summer, these officers decided that an honor society was the answer. Dean Wallace Trevillian was approached and appeared to favor the idea. He had two reservations. First, the club had to vote to become an honor society and second, the club had to be truly honorary in being and not just in name.

Shortly after the fall semester began the executive committee of the old club met several times and drew up a new constitution. A meeting of the club was called and the membership voted to accept the new constitution. The new constitution limits membership to the sophomore, junior, and seniors in Industrial Management whose grade point ratio equals or surpasses 2.75 and who demonstrate potential leadership ability.

The purpose of the new club is defined in the preamble to the constitution which states: The purpose of this club shall be to promote scholarship, leadership, and fellowship among members of the Industrial Management Department and Clemson University, and, finally to promote further study and education preparatory to entering the field of management.

This new form of the Industrial Management Society has been in existence less than two months, but it is already on the road to success. Eight new members have been added to the original thirteen to bring the club's total membership to twenty one. Plans are being made to conduct several money raising projects to build and maintain a scholarship fund for deserving IM students. A club pin has been designed. As can be seen, the club is staging a winning battle to stay alive.

The club has one long run goal that merits mention. It is the goal of the IMS to initiate action toward the formation of a national IMS with chapters on all campuses that have an IM department. This will take several years, but under the leadership of the present officers the initial steps will be taken.

The Industrial Management Society is now the official honor society of the IM department. Through the efforts of the present officers it is felt that the foundation has been laid to make the club one of the outstanding organizations on the Clemson campus.

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Walter F. Fancourt Memorial Seminar

Left to right: W. F. Fancourt, salesman, Wesley Connelly, Charles Miller, Millon Plyler, Henry Poston, Henry Milam, and Mr. T. A. Campbell.

The Third Annual Walter F. Fancourt Memorial Seminar convened Thursday, October 29 in Greensboro when top textile executives met with some 50 student and faculty representatives from 12 major colleges and universities in North and South Carolina to exchange views and opinions on the industry. Attending the Seminar from Clemson were Mr. T. A. Campbell, Jr., Wesley Connelly, Henry Milam, Millon Plyler, Charles Miller and Henry Poston.

Walter F. Fancourt, Jr., was the founder and first president of the W. F. Fancourt Company. Throughout his 50-year tenure as head of the company until his death in 1954, he maintained an eagerness to "keep the business going" by urging that industry adopt a close kinship with the textile schools and their students who would later provide the technological advances and leadership on which the textile world would grow.

Following his father's interest in young people, and as a tribute to his father and brother, John L. Fancourt, second son of W. F. Fancourt, Jr., instituted the first W. F. Fancourt Memorial Seminar in 1962. The primary aim of the seminar is to bring industry and education together in an informal atmosphere to discuss the future of textiles, to give the students a good working knowledge of some of the problems—and the progress—of the industry and to help decide direction of future careers.

A series of lectures and discussions were held at the W. F. Fancourt Company plant. Visits to the Greensboro plants of Burlington Industries, Inc., and Cone Mills Corporation were also part of the seminar. A tour of the Research and Development Laboratories was conducted at Burlington Thursday afternoon. Students visited the White Oak Plant of Cone Friday morning.

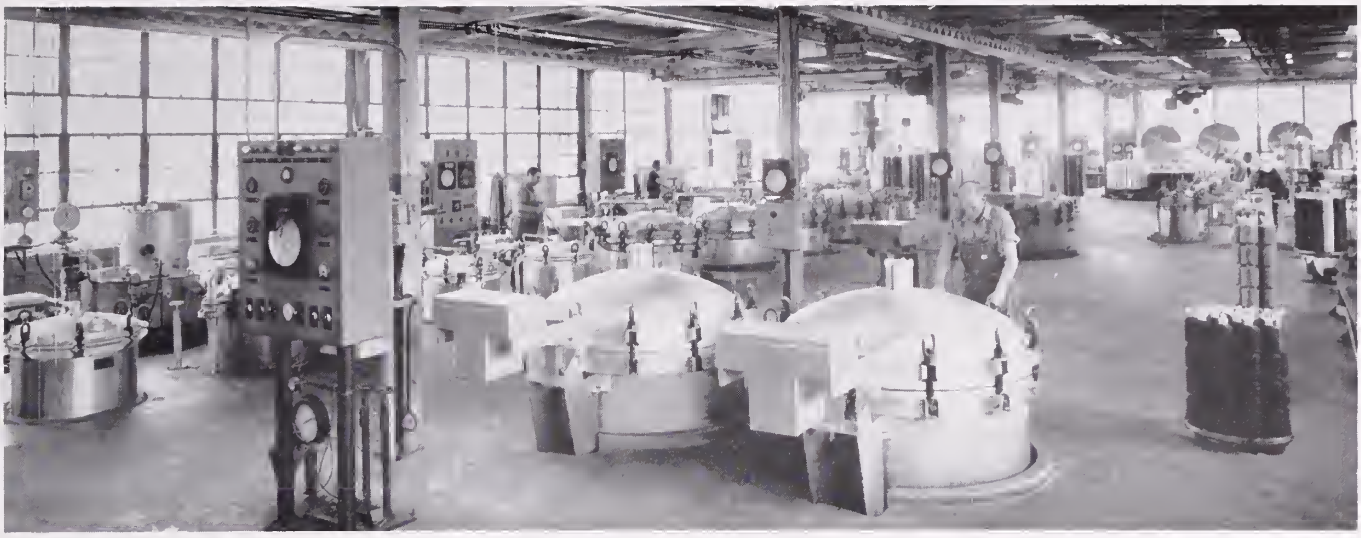
Alfred P. Slaner, President of Kayser-Roth Hosiery Co., and Executive Vice President of its parent company, Kayser-Roth Corporation, was the principal speaker at the Seminar Banquet Thursday night at the Sedgefield Country Club (Greensboro, N. C.)

Also speaking was Morris Frank, sports columnist of the **Houston** (Tex.) **Chronicle.**

Others who participated in the Seminar as lecturers were Clifton Hill Karnes, Director of Central Research & Development Laboratories for Burlington Industries, Inc., and John W. Bagwill, Vice President in Charge of Industrial and Public Relations for Cone Mills Corporation.

A panel of five specialists from different segments of the industry discussed job opportunities in the industry. These included Robert Dale McCabe, of New York, Managing Director of the Underwear Institute; Joel B. New, Director, Greensboro Field Office, United States Department of Commerce; Otis Little, Personnel Director of J. P. Stevens & Co., Greensboro; Reuben Ball, of Charlotte, President, National Association of Hosiery Manufacturers, and John W. Bagwill.

The colleges and universities participating in the Seminar were Belmont Abbey College, Clemson University, Davidson College, Duke University, Elon College, Guilford College, High Point College, North Carolina State College, University of North Carolina, University of South Carolina and Wake Forest College.



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ACCOUNTING -- A Useful Tool Of The Modern Manager

By JOHN M. WANNAMAKER

The author holds both the B.S. and the M.S. degree from the University of South Carolina. He worked with private industry prior to pursuing work on his advanced degrees. He has taught accounting for three years at Louisiana State University and is presently a candidate for the Doctor of Philosophy degree from that institution.

He is a member of Beta Alpha Psi national honor accounting fraternity, the American Accounting Association, and Phi Beta Kappa. He became a member of the faculty of the School of Industrial Management and Textile Science at Clemson in September 1963.

Although the double entry system of accounting as we know it today was formalized in published works only two years after Columbus discovered America, it is believed by some scholars that this publication only described the system of accounting which had been gradually evolved and had probably been in use in substantially the same form for at least three centuries. If one accepts these ideas, accounting as we know it has been used for almost 800 years. The question might be asked, "How can a discipline which is that old be termed a tool for a modern manager?

One answer to this question might be that businessmen over the centuries have found accounting to be a useful art which aids immeasurably in the decision-making role. In order to fulfill their role in society, businessmen are constantly making decisions concerning the investment of utility (service potentialities, which are commonly called assets), in order that the using up of these service potentialities will in turn generate other service potentialities (assets). It is with this process of using up service potentialities that the accountant primarily concerns himself. In accounting terminology the used up service potentialities are called expenses, and the service potentialities which are generated are called revenues. In a certain sense, revenues are rewards of efficient business decisions, and expenses are the efforts expended in order to achieve the rewards. The business decision-maker measures his "efficiency" with one of the final products of the application of the accountant's art — the income statement. This statement, then, covers the dynamic aspect of a manager's decisions to use up certain assets in order to generate other assets. The principle of dynamics involved is the movement of assets out of the asset category into the category of used-up assets (expenses) and the movement of other assets from the category of potentiality into the realm of newly created assets (revenues).

For a given period of time, the accountant's income statement sets forth the total new assets generated (revenues) and deducts from this magnitude the total of old assets used up (expenses); the difference, if positive, indicates that the managerial decisions were effective and, if negative, that the decisions were ineffective (if we assume that the generation of a net income is considered effective decision making). This, however, is only a part of what the accountant's art does for the manager.

In order for a manager to make effective decisions, he must have some means of knowing those service potentialities (assets) which he has at his disposal at any given moment of time. The accountant's art provides him with this information in the form of a position statement commonly called a balance sheet. Without this information, a manager would be compelled to make "hunch" decisions, because he would not know whether he had the economic where-with-all to carry through a given decision to its anticipated satisfactory conclusion.

The ideas behind accounting methodology are universal in that the means (hand-written, punch card, or electronic) of recording and reporting the vast amount of financial data which an effective manager needs is not a factor which limits the application of accounting. The speed with which the particular manager (firm) desires the financial information will govern the type of equipment to be used to record, manipulate, and report the data. If at some time in the future all accounting becomes computerized, the principles being taught today will be just as applicable, the sole difference will be that the device for recording, manipulating, and reporting the information will be a complex machine, but people who **know** what they want the computer to do for them must still program the computer, set up the data gathering for the computer, and interpret the data which the computer furnishes, and finally must check the computer's work to determine its accuracy.

All of the preceding discussion has been in very broad terms and possibly somewhat perplexing, but I trust not boring. I have tried to give a thumbnail sketch of what accountants attempt to achieve as their ultimate objective. I think there are few, if any managers, who would disagree with the objective of accountant's reports; but there may be many who may disagree with the techniques and procedures used by accountants to arrive at the conclusions. There is, for instance, the problem of the accountant's unit of measure of the service potentialities which he attempts to measure. The good old Uncle Sam dollar is the unit of which I am speaking. It changes its size over the years and the accountant has sometimes been criticized for treating all dollars recorded in the accounts as homogeneous; when, in fact, they are not. There have been various proposals to solve this problem, one of which is to convert all dollars to "current" dollars by using some index factor. The next question which presents itself, is what type of index shall be used, a general purchasing power index or a specific index constructed for each particular industry. Even if accountants could agree on which type of index is the best to use, they would say that we are getting away from the verifiable, objective (cost) basis of accounting and introducing subjectivity into the accounts.

This serves to introduce my thesis that **all** managers should know something about accounting. Under our present system of budgeting for a future period of time, trying to compel events during that time period to conform to plans (budgets), and comparing actual results with budget projections, the manager must of necessity have considerable sophistication in the area of accounting. This is not to say I believe that we should teach managers to be accountants, because managers need **much more** than a knowledge of accounting to be effective and successful managers; but accounting is one management tool which will make a manager a better manager if he can effectively master and use it for the specific purposes for which it is intended. Managers need to know what accounting reports and magnitude can and cannot do. With some of the relatively recent refinements of accounting for budgeting and cost control purposes, which is called "managerial" accounting" this discipline has become a relatively important tool in cost control, hence leading to greater managerial efficiency. Accounting serves only as one element for cost control; it cannot in and of itself control costs. Accounting cannot, in reality, control anything; it is people (managers) who control things. Therefore, managers must know how to use this element of cost control effectively, and in order to use it effectively, they must have more than a passing acquaintance with the discipline of accounting. Accounting can record and report only those transactions and events which are quantifiable in its measuring unit (the dollar). It can record and report qualitative events only in narrative (footnote) form, if the accountant deems such to be significant to the interpretations of financial statements.

Even the transactions and events which are recorded, summarized, and reported are recorded and reported in accordance with certain so-called "generally accepted" accounting principles or conventions. The idea I am trying to get across is that accounting is a discipline in its own right, and that those who would effectively use the products of this discipline as a tool in the decision-making process would do well to acquaint themselves, to some extent, with the mechanics used by accountants in arriving at the magnitudes to be placed in the accounting reports.

It is with the conviction that students in the Industrial Management curriculum should have the opportunity of choosing accounting as an area of secondary concentration that two new elective courses in accounting have been placed in the IM curriculum, Accounting 301 and 302—a two semester course in intermediate accounting theory. With these two accounting courses to round out the income tax course and the second course in commercial law, the interested IM student is given the opportunity to place twelve of his eighteen elective hours of credit in an area which will be of utmost benefit to him in any management capacity to which he may aspire.

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Unfinished Business

The elections are over and the nation is looking ahead to January when President Johnson will begin a new Administration and a new Congress will take office in Washington.

The textile industry has a number of items of unfinished business which must be attended to by the new Administration and the new Congress.

First, the two-price cotton system must be laid to rest permanently. At present, the system is at rest for a two-year period which ends in 1966.

Second, the textile program announced by President John F. Kennedy in May 1961 must be fulfilled if the textile industry is to be permitted to develop all of its potential. Fortunately, for the industry and for the nation, President Johnson has committed himself to the unfulfilled portions of the program.

Third, there must be a continuing analysis of the foreign trade situation to insure that it never again gets out of hand and to bring all textile imports under a system of controls such as those presently in effect for cotton textiles.

None of these items of unfinished business is asking for special attention or special treatment. Each is fully justified by the force of events taking place each day.

Their justification doesn't mean that they will be developed, however, without hard work and effort on the part of everyone in the textile industry.

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Undergraduate Research Abstracts

Editors Note: This is a continuation of an article from the Fall Issue 1964.

The Effects of Advertising on the Clemson Students' Buying Habits

Carlisle C. Norwood

In recent years advertising has come to be a deciding factor in the success or failure of many firms; it is therefore necessary that surveys be taken to determine the products wanted by the public and what affects their choice of these products. That is, which advertisements do they like best, and through what media are the most reached.

A survey was taken from 100 Clemson men living in the university dormitories, and it was found that all felt that advertising affected the products they purchased. It was also concluded from the survey that their interest was captured by animated cartoons and scientific facts, and the maximum number of them will be reached by television and magazine advertising.

If a firm is to succeed, advertising surveys are a must, an although the one run here was very simple, it pointed out its importance very strongly.

Why Saco-Lowell Came South

James Terry Owens

The purpose of this paper is to show why Saco-Lowell, one of the largest textile machinery manufacturers in the South, decided to change its location from Maine to the Carolinas. In personal interviews with an executive at Saco-Lowell, who played a part in the migration of the company to the South, the major economic reasons were revealed. The main reason was to be nearer to the market for their products. The transportation costs that were saved were enormous. There were other factors that were favorable in the South, but these were subordinate to nearness to market. These were labor factors such as wages, attitudes, skills, etc.; nearness to materials, climate, and local industry structure.

Mining, Milling, and Uses of Vermiculite-Zonolite Company

Samuel L. Ramsey and Don H. Adkins

This paper is intended to bring to light a relatively new mineral vermiculite. This paper begins with the discovery of vermiculite and continues to give information relating to its prospecting, geological composition, and its characteristics.

Also included in the paper are the present mining procedures that have developed after years of experimentation with different techniques of obtaining the ore. Included in the mining section are some of the problems that are encountered and how they are solved.

In the next section there is a thorough discussion of the milling procedures used at the Kearney, South Carolina, mill. This is a discussion of the operations concerned in abstracting the mineral from the raw material brought from the mine, right on through the process until the vermiculite is ready to be shipped to the expanding plant.

The paper is concluded with a complete discussion of the present uses, potential uses, and uses in the experiment stage.

Wool —From the Sheep to the Consumer

Lenzy S. Randall

This paper, **Wool — From the Sheep to the Consumer**, was written largely from library books obtained from the Clemson University Textile School Library. The material was supplemented with interviews with company management and from my own experience in a textile mill.

I chose this topic primarily because I wanted to learn something of the woolen processes. I plan to go with Johnston Mill on completion of graduation and this is another basic reason for my interest in this subject.

I feel that the objective of this paper was accomplished satisfactorily, for I do feel that I learned a great deal about the processing of wool performing research for this paper.

The Industrial Management Department of Clemson University designed this course primarily to give the student a chance to conduct primary research on his own. This was one of the difficulties I encountered while writing this paper. It was difficult to conduct primary research on such things as the processes which wool undergoes. The main portion of the primary research had to be conducted in the portion of the paper entitled, "A Look to the Future." With the exception of the above difficulty, I think the objective of the paper was accomplished satisfactorily.

Plant Relocation of the Pelton and Crane Company

John A. Richards and Fred L. Wallace

A long history of unsatisfactory dealings with the A. F. of L.-C. I. O. United Auto Workers Union manifested itself in several ways: Pelton & Crane Company's inability to compete economically with other surgical and dental supply companies, a severe shortage of skilled labor, and management's incapacity to return a fair and equitable dividend to their investors. In the early 1950's the Pelton & Crane Company officials realized that, to keep abreast with the industry's technological advancements and to improve their economic condition, a move from Detroit and U.A.W. was a necessity.

After considering several possible new sites, Charlotte, North Carolina was selected. The reasons for this selection were many and varied.

Charlotte offered an abundant water supply, a natural resource vital to Pelton & Crane manufacturing processes. The electric power that Duke Power supplies is one of Pelton & Crane's most used utilities.

Due to the nature of the equipment that Pelton & Crane manufactures, they find it necessary to ship almost exclusively by truck. In this respect, a better site could not have been chosen because Charlotte has in excess of one hundred trucking companies.

Pelton & Crane's needs, while being varied, are more or less concentrated around the metalworking and its supporting industries. Because Charlotte is the center of the South's metalworking and supporting industries, it again was the most likely choice.

Skilled labor in the classifications that Pelton & Crane desired was not readily available in Charlotte. However, within a few months after the move was completed, the Company was fully staffed with trained employees and operating at efficiencies hereto fore unknown.

In the few years that the Pelton & Crane Company has been located in Charlotte, their sales increased 75%, net earnings increased from $49,123 to $140,139. Presently, the Company is expanding its production facilities and developing new products.

A Survey of the Labor Turnover in the Textile and Metal Product Industries in Oconee County

William E. Smith and Robert W. Griffith

This report determines the extent and causes of labor turnover in textile and metal product industries in Oconee County.

The extent of labor turnover in Oconee County was 24.3% in textile fabrication plants, 5.5% in textile finished product plants, and 14.1% in metal product plants. These are comparatively high turnover rates; therefore, it should be pointed out to the companies how much this high rate of turnover is costing. These costs have been enumerated in the text, and ways to improve employee turnover has been cited in Appendix B.

Factors under the headings of type of labor, wage rates and fringe benefits, and working conditions were studies in relation to textile fabrication plants, textile finished product plants, and metal product plants. This was done for the purpose of determining which factors affected labor turnover the most. The main factors were found to be: age, sex, wage rates, and shift differentials.

A company's turnover rate has considerable immediate significance. It should be computed honestly and studied carefully. It is also important to remember that computing the turnover rate is only preliminary to analyzing it, as has been done in this report.

Reactions of the People of the Clemson Area to the Present State Sales Tax and Its Proposed Increase

Lannie H. Thompson and William R. Burnette

The findings of this paper indicate that a tax is not feasible at this time. After studying the tax law and then talking to the people of this area, it was found that the ordinary individual knew very little about the actual content of the law. Their knowledge consisted of knowing the tax rates and little more. It was obvious from talking to these people that more money for education is necessary, but none of them wanted to pay for it. This feeling was also found to be evident in the town of Clemson itself, where most of the people are touched by the University every day. Since no one wanted to raise taxes, other methods for raising revenue were offered. These suggestions ranged from legalized gambling to a two percent property tax, and neither of these is feasible.

In conclusion, it can be said that the state of South Carolina is in for a bad time if the sales tax is raised. However, one bright spot is that the opinions of sales tax and education found in this area may not represent the feeling of the entire state.

The Conversion of Neutral Sulfite Semichemical Black Liquor to Acetate and Formic Acids in the Pulp and Paper Industry

W. Price Timmerman, III

In June of 1958, Sonoco Products Company of Hartsville, South Carolina, culminated eight years of research and an investment of some $250,000 beginning operation of their Chemical Recovery Plant. This plant is the first plant in the world for the conversion of pulp mill black liquor to acetic and formic acids on a commercial basis.

The process consists of the concentration of the waste product, black liquor, to 40-45% solids, followed by approximately stoichimetric acidification with H_2SO_4 to liberate the acetic and formic acids from their sodium salts; this acidified liquor is solvent-extracted countercurrently with 2-butanone (MEK) to recover the acids; the mixed acetic and formic acids are refined for sale—the acetic product being glacial (99.5%) and the formic product being 90% acid. The raffinate from the extraction is sold to draft mills for its salt cake value.

Startup and operational problems have been numerous and equipment corrosion proved to be very serious on most equipment. The economics of the overall process are discussed with emphasis on the utility of such a process in improving the economics of cross-recovery between neutral sulfite semichemical and kraft mills.

The Hartwell Dam Project and Its Effects on Surrounding Areas

Robert F. Tucker and Ronnie E. Crolley

The purpose of the research paper was to study the effects of the Hartwell Dam Project on the surrounding areas. Through personal interviews, research, correspondence with Chambers of Commerce in the area, Corps of Engineering at Hartwell, Georgia, Dr. Stepp of Clemson University, and personal knowledge the authors have come to the conclusion that there are both favorable and unfavorable effects on the area. The project actually discourages industry from locating in the area by converting a flowing stream into a reservoir, by producing a cheap power, and by the loss of private and municipal water rights. The project would provide a flood control preventative only in the area below the dam to the Clark Hill Reservoir and not all the way to Augusta as was expected. Next, the authors feel that the project gives a tremendous helping hand to navigation from Augusta to Savannah. Lastly, the authors feel that the project serves best the realization of one of the purposes for which it was intended.

An Objective Analysis of the Development of the Trade Union in American Industry, and Its Effect on the Industrial Complex

Edward J. Werntz and Bobby E. Kemp

The union movement in America is an important part of our industrial system. We see that the union has both good and bad points in its system of collective action. We can see how the union alters and impedes the growth of industry through stern collective bargaining. But, on the other hand, we note its power to protect the individual worker from unfair arbitrary action by management. We show that there does exist an element of corruption in the union, but again we see the union has given the workers organized representation in public affairs through the union's political activities.

In the long run, we do not see how the union can hold its relative strength in the labor market unless it unionizes the marginal women workers that tend to hold more and more of the clerical jobs. Also, men of higher levels of white collar workers see advancement in the management end of industry and therefore exclude themselves from the union.

In all, it does seem that the unions are losing relative strength, though not necessarily absolute strength. We can evidence a stronger position being taken by management against unions. The steel strike in 1959, the Lookheed position in 1962, all give glowing support to this.

Fiberglass Reinforced Plastic

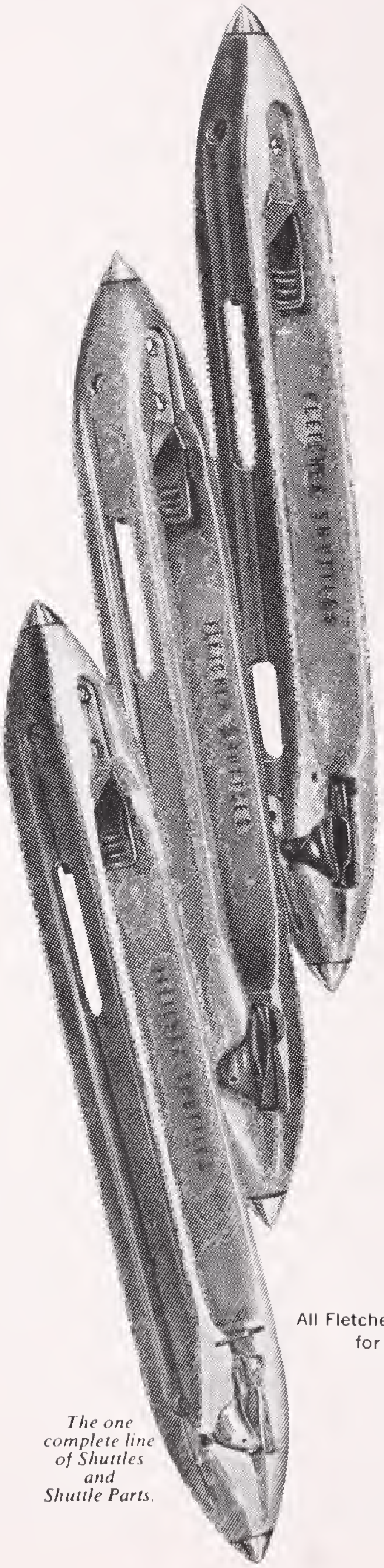
Robert L. Matthews and Newton F. Manly, III

FRP is a relatively new product in the glass and plastic industries; 1946 being about the time it was first introduced. FRP is being used in many new products and at the same time replacing other established materials, not thought to have a substitute. This leads to the problems of whether FRP should be used or not, and if so, which of the fifteen processes now available would produce the results desired. Each of these processes a FRP material of different property characteristics and it is up to the designer to match the process to the product. Regardless of which process is used, FRP in the broad sense has these basic advantages: a favorable strength-weight ratio, good dielectric properties, corrosion resistance, and favorable cost/performance combination.

Most of the present applications of FRP are centered around three main areas: Construction, Transportation and Electrical. The largest single use of FRP is in the manufacture of pleasure boats. Other major uses of FRP are automobiles, construction paneling, and printed electrical circuits.

The most important applications of FRP in the near future are in the field of military components and also transportation vehicles.

It is evident, that end users in all fields of industry may benefit and profit significantly from increased use of FRP in the future.



Some talk about

FLETCHER SHUTTLES

The other day one of our nice customers made a comment. "You fellows might be third in the 'Big 3' " he said, "but Fletcher Shuttles are tops with us".

We've heard this kind of remark more and more here of late. (And don't think we don't like it. We're human, too, you know.)

Anyhow, when we passed the remark along to the boss he brought us back to earth. "When we get up there on top we'll pay attention to compliments", he barked. "But while we're in third place, pay attention to complaints".

Smugness is a luxury you can't afford when you're only number three.

That's why we keep everlastingly at it— trying harder, improving our service and putting more time in making the best shuttles even better.

All Fletcher Shuttles are Fully Guaranteed
for Quality and Performance.

The one
complete line
of Shuttles
and
Shuttle Parts.

FLETCHER
Shuttles

Southern Pines • North Carolina

Outstanding Seniors . . .

MARSHALL WHITE, JR.

Marshall White, Jr., a twenty-one year old textile chemistry major, is a native of Rock Hill, South Carolina. He is better known to his friends as Sonny. To aid with his expenses at Clemson, he has received a Leon Lowenstein Foundation Scholarship, an Elk's Scholarship, and a Belk's Scholarship.

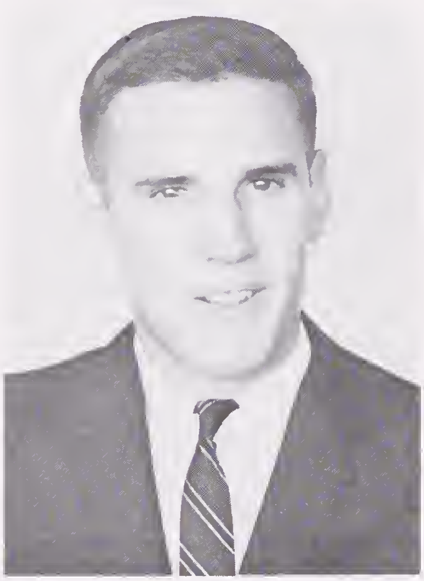
On campus, Sonny is a member of Phi Eta Sigma, Phi Kappa Phi, Phi Psi, YMCA Senior Council, American Association of Textile Chemists and Colorists, Residence Hall Supervisors Association, and the Honors Program. He serves as treasurer of Phi Psi, chairman of the Men's Residence Court, and circulation manager of the Bobbin and Beaker. He received highest honors during his freshman year and high honors during his sophomore and junior years.

Sonny has gained valuable experience in the textile industry by working for three summers in the Research and Development Laboratory of the Rock Hill Printing and Finishing Co.

After graduation he plans to attend graduate school.

Gerald Wayne Caughman is a twenty-two year old Industrial Management major from Lexington, South Carolina. He has been an honor student every semester at Clemson.

On campus, Jerry has been very active in several organizations. He was director of Tigerama held in November. He is president of Kappa Delta Chi social fraternity, a member of Blue Key and the High Court, and is listed in Who's Who in American Colleges and Universities.



GERALD W. CAUGHMAN

During vacations Jerry has worked one summer with Pacific Mills and several summers as a linesman's helper with an electric cooperative.

After graduation Jerry would like to go to graduate school at the University of North Carolina to work towards a master's degree in business administration.

W. Wesley Connelly is a Textile Management major from Spartanburg, South Carolina. He is twenty-two years old and is married. To aid with his college expenses he received a David Jennings ('02) Memorial Scholarship.

While at Clemson, Wesley has been an active member of several campus organizations. This year he serves as president of the American Association of Textile Technology, secretary of Phi Psi, and advertising manager for the Bobbin and Beaker. He is enrolled in the Advanced ROTC.

During the past three summers, Wesley has gained valuable experience in his major field by working with Beaumont Mills in Spartanburg.

After graduation, Wesley plans to enter the Army for a two year tour of duty.

W. WESLEY CONNELLY, JR.

So many
good things
begin with

ENKA

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INDUSTRIAL MANAGEMENT SEMINARS

Left to Right: Dr. C. H. Whitehurst, Jr., Head, Industrial Management Dept., Clemson University; Lt. Col. John D. Peters, Arnold Engineering Development Center, Arnold Air Force Station, Tenn.; Mr. S. G. Nicholas, Director of Engineering Research, Clemson University.

Left to Right: Prof. C. V. Wray, Chairman, Industrial Management Seminar Series; Mr. Harvey T. Stevens, Senior Vice President, Automatic Retailers of America, Inc., Philadelphia, Pennsylvania; Dr. C. H. Whitehurst, Jr., Head, Industrial Management Dept., Clemson University; Mr. Roy Gramling, Automatic Retailers of America, Inc., Atlanta, Ga.

THE INDUSTRIAL MANAGEMENT SEMINAR SERIES HAS CLOSED OUT ANOTHER SUCCESSFUL SEMESTER

Speakers for first semester were:

October 15—Lt. Colonel John D. Peters, U.S.A.F., Assistant DC S/Research, Arnold Engineering Development Center, Air Force Systems Command, Arnold Air Force Station, Tennessee. Col. Peters spoke on "The Role of the Military Manager in the Military-Industry Contract Relationship."

November 5—Mr. Harvey T. Stephens, Senior Vice President, Automatic Retailers of America, Inc., Philadelphia, Pennsylvania. Mr. Stephens used as a subject "Creative Management."

November 19—Mr. William C. Laffoday, National Retail Sales Manager, Sears, Roebuck and Co., Chicago, Illinois. Subject "Personality Development."

Industrial Management Seminar Series is open to faculty and students of School of I.M. & T.S. and all others who may wish to attend.

New Course in Textile Chemistry

A doctoral program in chemistry with major emphasis on textile chemistry is one of the newer courses of study being conducted by the Clemson University Graduate School.

Announced jointly by Dr. Howard L. Hunter, dean of the College of Arts and Sciences, and Dr. Wallace D. Trevillian, dean of the School of Industrial Management and Textile Science, the program is the first to be offered in the Southeast, combining the extensive theoretical studies of the chemistry department with the more specialized work of the textile chemistry department in a cooperative interdisciplinary program.

The graduate degree will be a Ph.D. in chemistry with a major in textile chemistry.

Complete information about requirements for admission to the new program may be obtained from the Dean of the Graduate School, Clemson University. Some fellowships are expected to be available for qualified applicants.

INDUSTRY TODAY -- EDUCATION TOMORROW

Wallace D. Trevillian, Dean
School of Industrial Management
and Textile Science

Newsweek, in its November 2, 1964 issue, describes the 16 billion dollar a year textile industry as being in the midst of a renaissance.

In an address to Clemson faculty and students on the opening day in September 1898, Clemson's president Hartzog commented, "Today the doors of the first textile school in the south are thrown open to students." The 67 years that intervene between 1898 and the present have witnessed revolutions in all phases of the industry. South Carolina has shared exceedingly well in the developments since 1898. Today:

1. 344 plants are located in 37 of the state's 46 counties.
2. Nearly 140,948 employees annually earn more than $460,270,287 representing 60.4 per cent of the state's industrial payroll.
3. 2,381,374,524 for the fiscal year ending June 30, 1963, representing 57.3 per cent of the value of the state's industrial payroll.
4. 6,954,478 spindles, accounting for 33.8 per cent of the nation's active spindles as of June 30, 1963; 153,879 looms; produced 1,039,000,000 linear yards of cotton broad woven goods in the first quarter of 1963 to account for 41.9 per cent of the national total.
5. South Carolina is now the nation's greatest producer of broad woven goods. Its finishing plants process about 30 per cent of the nation's yardage.
6. The annual value of textile products in the Palmetto State has almost tripled since World War II and now approaches two billion dollars.
7. Over 33% of the American textile industry is in South Carolina.

Clemson's contribution to these developments in South Carolina in the last 67 years has been in education (teaching and research), educating the manpower and leadership for the industry.

A questionnaire mailed to 2,100 former students got a 66% response. Of those heard from 75% are still in textiles and the positions of those directly in textiles are distributed as follows:

President, Vice-President, General Manager	7.89%
Plant Managers & General Superintendents	8.27
Superintendents	9.40
Technical Superintendents and Asst. Superintendents	14.54
Overseers	15.66
Assistant Overseers	7.52
Trainees	10.28
Staff	16.79
Research	2.26
Sales and Service	6.52
Office Managers	1.00
Total	100.00%

Statistics such as these can never tell the full story of Clemson's contribution, for this survey dealt only with textile graduates. It does not include graduates from engineering, chemistry, physics, agriculture, arts and sciences, and industrial management—many of whom have followed a career in textiles.

The renaissance referred to by Newsweek is exemplified by such innovations as central air systems, automatic doffers, "shutterless" looms and electronic controls—to name a few conspicuous technological changes occurring through the industry.

Even for the casual observer, the sophisticated equipment displayed at the Hanover Textile Machinery Exposition in 1963 and the Greenville Textile Show in 1964 reflects clearly the rapidity of change that is taking place for this industry. The many different languages heard at these industrial shows, the foreign trademarks on machinery, the labels on the finished products, all dramatize the international aspects of the industry as the world wide market becomes meaningful to both the producer and the consumer. It has been said that the first thing an underdeveloped country starts to produce is textile goods or a moving picture. Parenthetically—the movie industry was in a slump until it was realized the objective was to produce entertainment, whether it be for a fifty foot screen or a twelve inch screen is incidental. There may be some parallel to this in the renaissance occurring in textiles. Alert management is geared to produce fabric which is completely different from fabric of bygone days and when it is technologically feasible, the final products might well be "simplified" to the extent that little similarity will exist between the old processes required for the end product.

The Wall Street Journal in recent months too has had encouraging reports for the public regarding the industry. Less surprising has been the range of optimistic statements made by the executives, all reflecting a new day for the industry.

But, what about the schools historically responsible for furnishing talent to the industry? What changes are occurring on the campus? Curriculum development seldom make headlines. At Clemson much has changed since Dr. Hartzog announced the opening of the first textile school in the south.

The undergraduate offerings of the School of Industrial Management and Textile Science in 1965 include three distinct courses of study. They are:

1. The Bachelor of Science in Textiles.
2. The Bachelor of Science in Textile Chemistry.
3. The Bachelor of Science in Industrial Management.

THE BACHELOR OF SCIENCE IN TEXTILES

There exists a body of knowledge peculiar to textiles, which makes the application of scientific principles to textiles unique. Hence, the student selecting this curriculum will discover constant challenges and opportunities worthy of his talents.

The course work is divided into five areas for emphasis.

Quantitative Measurements and Analysis: Basic disciplines in this area include analytic geometry, calculus, statistics, costing analysis, and quality control.

Basic Science: This includes physics and chemistry. On this foundation the more specialized courses are developed.

Communication: This includes special courses dealing with the use of language, both written and oral. This ability is further developed in seminar and research courses and emphasized in all courses.

Social Science and Humanities: By studying English literature, the history of western civilization and economics, the student is given a broad base from which to explore additional knowledge in such areas.

Textile Science: These courses include the body of knowledge unique to textiles and reflect the necessity of strong science and mathematics background. Examples of the subjects covered are, machine mechanisms, the interactions of the mechanical operations used in fiber processing, the geometry and properties of fiber, and instrumentation.

THE BACHELOR OF SCIENCE IN TEXTILE CHEMISTRY

Preparation for a future in the modern textile industry requires training in a great many areas of science. The manifold types of materials used in the textile industry; such as natural fibers, synthetics polymers, dyes, and finishing agents; necessitates a working knowledge of the fundamental concepts underlying the properties and behavior of these products along with their practical utilization. The curriculum in Textile Chemistry is designed to accomplish this purpose by including courses in chemistry, mathematics and physics. It includes courses in fiber and fabric formulation, dyeing, polymer chemistry, colloid chemistry and inorganic chemistry all related to textiles. Other areas of study include statistics, quality control and fiber science.

In 1965 the two curriculums referred to above replace the three previous curriculums in textiles known as Textile Science, Textile Chemistry and Textile Management.

THE BACHELOR OF SCIENCE IN INDUSTRIAL MANAGEMENT

"I believe, however, that time will show that the management schools of the country have taken a major **turn** in the past ten years and that the study of management decision-making on a national basis is both more demanding of talent and productive results than ever before." So says Howard Johnson, Dean of the School of Industrial Management of M.I.T., Dean's Report 1964.

The ten years referred to in Dean Johnson's report is the same ten years that Clemson has offered this degree. It is no accident that Clemson took **the lead in this turn.** (See Bobbin and Beaker, "Mathematics and Management" by Dr. C. H. Whitehurst, April 1964).

Since the Management curriculum has been reviewed recently in Bobbin and Beaker it is referred to here only for continuity and to emphasize that the undergraduate programs of this school include three major curriculums. The graduate programs will be discussed in a later issue.

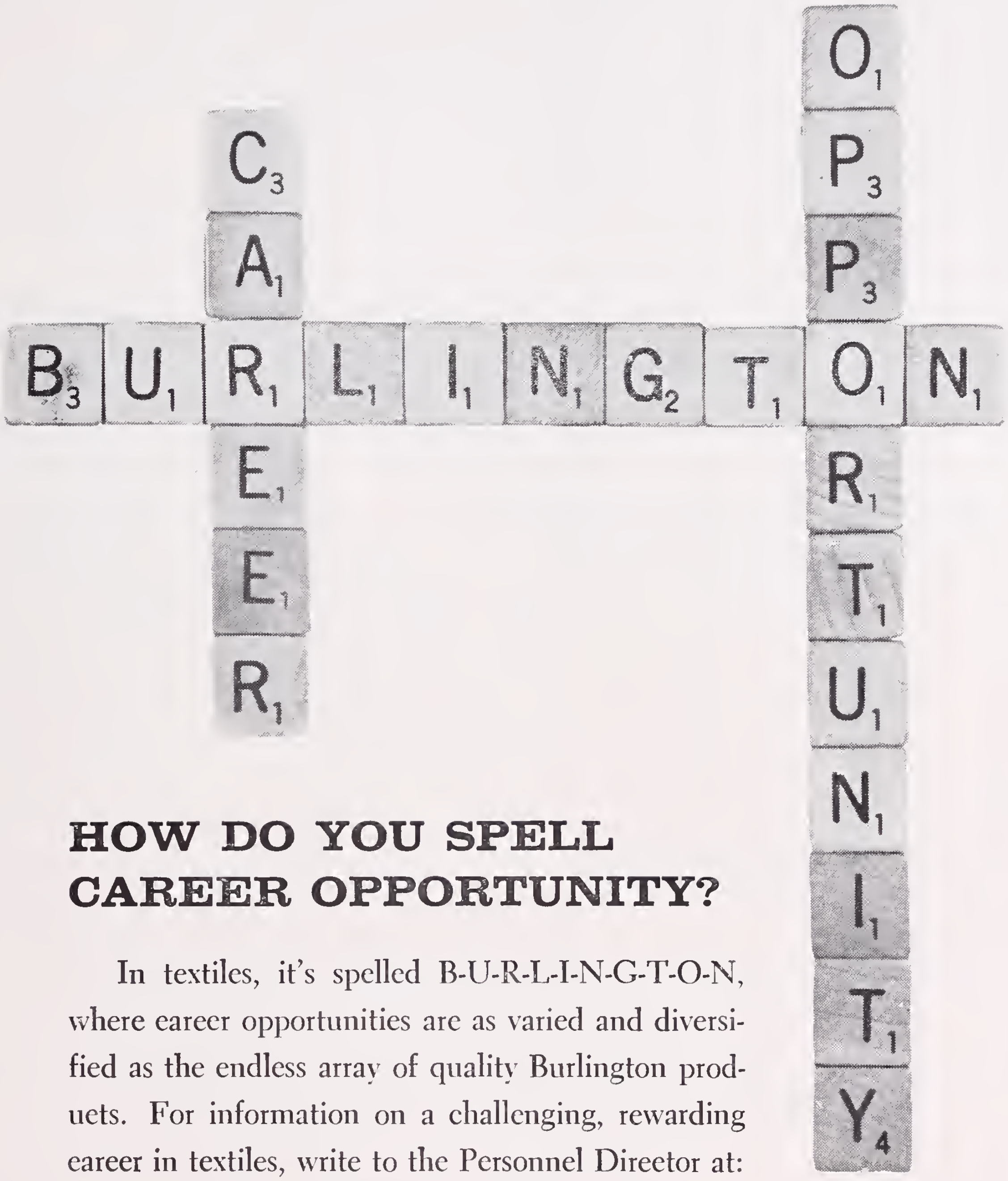
These curriculums are based on the premise that the best education is that education which provides the student with a foundation from which to study and learn the rest of his life.

The course of study a student selects for four years is but one part of his education and development and the curriculum can be no better than the teacher responsible for the courses. Clemson takes particular pride in the caliber of its faculty. The faculty is fully cognizant too of the necessity of continued study and research—if for no other reason than to avoid obsolescence. In this school alone two faculty members are currently writing dissertations for completion of the Ph.D. One is on leave of absence studying for a terminal degree. One resigned in order to work toward a Ph.D. at Clemson. One is completing his internship for the C.P.A. certificate. Others are constantly attending professional seminars and participating in refresher courses — still others plan study leaves in the near future. Now, there is no more a division between research and teaching careers. The entire staff is responsible for teaching, ultimately all will be responsible for research too. Furthermore, in addition to the academic environment, a good part of the student's development depends on his choice of friends, his extracurricula activity, yes, even the bull sessions, and certainly his church. Clemson provides all of this—and a lot more.

A. A. T. T. Field Trip

The Student Chapter of A.A.T.T. at Clemson University made a most enjoyable field trip on Thursday, November 12, 1964. The twenty-five members accompanied by Mr. Richardson, the faculty adviser, made the trip to Greenwood, S. C. The group making the trip left the campus around eight A.M. and arrived in Greenwood about nine thirty A.M. There they were met by Mr. M. V. Wells, the Personnel Director of Greenwood Mills. He escorted the group to the Adams Plant, which is Greenwood Mills' most modern plant in production at present, and which produces combed cotton goods. The group was divided into sections of five or six and each section was given a guide who took them on a tour of the plant. Since the guides were all Clemson graduates there was probably as much talk about Clemson as there were questions asked about the Adams Plant. But everyone was given a chance to ask any question about anything he would like to know concerning Greenwood Mills. After the tour of the Plant, it was approaching lunch time so the group was taken to the Greenwood Country Club where they were treated to a delicious meal.

After leaving the Club, the group headed for their next point of interest, the Chemstrand Nylon Plant near Greenwood. This plant has been in operation since September 1960 and produces only nylon yarns. Again the group was divided, given a guide, and shown through the plant. When the tour ended, the field trip was over except for the return journey to Clemson.



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To maintain our standards, we are seeking young people with imagination and initiative. If you are interested in becoming a part of our future, write Industrial Relations Department, Cone Mills Corporation, Greensboro, N. C.

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CONE ®

Phi Psi Initiates New Members

Left to right: seated, Sanders Goodman, Will Brown, Kenneth Eubanks, David Settle, Mac Harley, Michael Lee, and Clarence Fowler.

On November 30 the Iota Chapter of Phi Psi initiated four seniors, three juniors, and one sophomore.

The Seniors are Kenneth A. Eubanks, a 21 year old Textile Management major from Lyman; Michael L. Lee, 21, also a Textile Management Major from Walhalla; Kenneth J. Rowe, a 21-year old Textile Chemistry Major from Manning, S. C.; and Clarence L. Fowler, 21, another Textile Management Major, from Duncan, S. C.

Among the juniors was Sanders E. Goodman, 20, a Textile Science Major from Salisbury, N. C. Also in the group were David L. Settle, a junior from Inman, S. C., and Will T. Brown, Jr., 20, a Textile Chemistry Major from Covington, Ga.

The one sophomore initiated was Mac Harley, a nineteen year old Textile Chemistry Major from Barnwell, S. C.

The Brothers of Iota Chapter are happy to welcome this new group of brothers in the fraternity!

On October 26 the brothers had a steak supper at the home of the faculty advisor, Mr. David Gentry. The group had a good time renewing friendships after a long summer vacation.

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Chalmers
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TEXTILE DICTIONARY

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in Textile Processing

C

Corobex (Kôr ′a-bex)

A durable anti-bacterial additive for textiles. Provides fixed, lasting protection against germs, mildew, perspiration odors and other odors of bacterial origin.

Easily applied during dyeing or finishing operations. Will cause no shade change in dyed and printed colors, no yellowing of whites. Does not affect the hand of the finished goods. Compatible with most types of finishing materials.

D

Discolite[2] (dĭs′ kō · līte)

Concentrated sodium sulphoxylate formaldehyde available in lump, pea, rice or powder form.

A powerful reducing agent, stable at high temperatures. Widely used to effect reduction and solution of vat colors, and for discharge effects when applied to colored grounds. Effective when mixed with vat colors and discharge pastes wherever the reducing agent must retain its reducing power after being dried into the fabric.

Dispersall (dĭs · pûr′ sal)

A long chain ethylene oxide condensate in the form of a colorless, neutral, somewhat viscous liquid. Fully resistant to hard water, and miscible with water in all proportions. A retardant and leveling assistant in vat dyeing.

Used widely as a dispersing agent in dyeing synthetic fibers with disperse colors and for fast color salts and bases in Napthol dyeing and printing.

Effective in stripping to prevent redeposition of the color on stripped goods.

N

Neofinish (Ne/.O.Finish)

Non-Ionic softener dispersible in hot water, suitable for all textile fibres, both natural and synthetic. Compatible with all types of finishing materials, including resin finishes. No development of color or odor in goods finished with Neofinish, even in storage. No yellowing at time of application.

Neowet (nē′ ō · wĕt)

Complex Polyethelene Ether in the form of a pale yellow, slightly viscous liquid.

A non-ionic surface active wetting agent, effective at all temperatures. Completely compatible with enzymatic desizing agents and readily soluble in water. Contains 33⅓% active ingredients. Widely used in scouring all types of textile fabrics and for general wetting purposes.

Neowet X (nē′ ō · wĕt)

Organic Ether Sulphonate in the form of a water white slightly viscous liquid.

An anionic surface active wetting agent, effective at all temperatures. Does not affect enzyme activity in desizing. Compatible with hydrogen peroxide and resin finishes. High detergent value. Contains 20% active ingredients.

Neozymes[1] (nē′ ō · zīms)

Desizing agents made up of amylolytic, proteolytic and fat splitting enzymes available in the form of crystalline powder or liquid concentrate for high or low temperature requirements.

Neozymes quickly remove all trace of starch glue or gelatin sizing without danger of damage to even the most delicate fabrics. For best results, use with NEOWET to speed saturation.

P

Parolite[2] (păr′ ō · līte)

Zinc sulphoxylate formaldehyde in the form of white crystalline powder. A highly concentrated stripping agent for all forms of wool and modern synthetics.

Completely soluble in water. Leaves stripped goods soft, completely free of zinc dust and in most receptive condition for further processing. Often completely strips goods where other stripping agents fail. Very effective in discharge printing on acetate rayon.

V

Vatrolite[1] (văt′ rō · līte)

Concentrated sodium hydrosulphite in the form of white crystalline powder. A powerful reducing agent for vat colors, ideal for dry feeding because of its free flowing, dustless character. Completely soluble in water.

Effective stripping agent for direct, sulphur and vat colors on cellulosic fabrics.

Quickly removes rust stains from cotton goods.

May be stored indefinitely.

Available with optical whites and in buffered formulas for high temperature use without excessive alkalinity.

Velvo Softener (vel′ vō)

A highly sulphonated tallow in the form of a creamy white paste, easily dispersed in water. Used in general finishing of all types of textile fabrics. Will not "smoke off" or change color in high temperature operations such as calendering or drying. Has no effect on light fastness of colors.

Strategically placed warehouses plus
company owned trucks add up to fast
dependable delivery, every time.

Royce
CHEMICAL COMPANY
EAST RUTHERFORD, NEW JERSEY

Professional Development Courses For 1965

Courses for Professional Development, a Clemson University program designed to keep industrial personnel in step with advancements in science, technology and management begins its eighth annual schedule of classes this summer in the School of Industrial Management and Textile Science.

Courses to be offered in 1965 and the dates for each are as follows:

JUNE 7 through 18:

P. D. 43—Basic Textile Chemistry

JUNE 21 through 25:

P. D. 22—Introduction to Textile Manufacturing, Dyeing and Finishing

JUNE 21 through JULY 2:

P. D. 25—Yarn Manufacturing
P. D. 38—Supervisor Development
P. D. 41—Methods Analysis and Time Study
P. D. 44—Advanced Textile Chemistry

JULY 12 through 23:

P. D. 25—Yarn Manufacturing (a repeat)
P. D. 41—Methods Analysis and Time Study (a repeat)
P. D. 47—Quality Control
P. D. 56—Weaving

One new course which should be of interest is P. D. 79—Graduate Seminar in Industrial Administration: A Survey of Literature and Developments Since 1960. This course will be offered July 12 through July 23 and is limited to holders of bachelor's degrees awarded prior to 1960. These persons must be presently employed in a managerial position. Following areas will be specifically tested: Managerial Policies; Managerial Economics; Production Planning and Control; Industrial Dynamics; Financial Analysis; Quality Control.

In April a catalog, containing all pertinent information, along with application forms, will be mailed to those who have received these in the past as well as anyone requesting copies. For this, and any additoinal information, write Prof. C. V. Wray, Sirrine Hall, Clemson University, Clemson, South Carolina.

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At Whitin, the doors are always open for new ideas and to new people. The success of any organization is directly proportional to its willingness to base its growth on the thinking of dynamic, creative, forward-looking people — people with the special knowledge and abilities to translate new ideas into practical plans and programs. Whitin has welcomed many. Each has made significant contributions to the improvement of Whitin products and services.

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1964 Sees Initial Fruits of IM Master's Program

The department of industrial management in Clemson University's School of Industrial Management and Textile Science awarded three history-making advanced degrees this year, setting a pattern of leadership for the quality training of potential industrial leaders and executives for South Carolina and the Southeast.

First to receive the degree, at February commencement exercises, was Roy A. Dalton, a native of South Carolina and Clemson graduate. Although sought by several of the nation's largest corporations in such diverse fields as railroad transportation and petroleum, Dalton elected to cast his lot with Fieldcrest, Inc., a North Carolina textile firm.

Richard B. Autry, a graduate of Oklahoma State University, was also awarded the M.S. in industrial management, in June. Bruce M. White of Greenville, another Clemson graduate with an English major and mathematics minor, received his master's degree at the university's August graduation. He has been awarded a fellowship to continue study toward the Ph.D. at the Univeristy of Florida.

"The industrial management master's program since its inception less than two years ago," relates Dr. Clinton H. Whitehurst, head of the Clemson IM department, "has attracted wide attention in the Southeast with its orientation toward providing a top-rated management degree for the engineer and physical scientist. Graduates from liberal arts curricula are not, however, excluded; in fact, they are encouraged to apply. Necessary remedial mathematics and/or other course deficiencies can usually be completed during the summer sessions of any first order college or university."

Fourteen students began the fall semester as candidates for the IM master's degree. Graduates of six colleges or universities, their preference in undergraduate study shows four mathematics majors, two each from engineering, economics and textiles, and one each from physics, forestry, accounting and business administration.

Two foreign students, representing Norway and Korea, began their studies in industrial management at Clemson this fall.

SOMETHING OLD, SOMETHING NEW

While textile scientists continue to develop the glamorous world of man-made fibers, another industry group is investigating the chances of developing a good natural fiber from the hide of an ugly, out-of-the way animal.

The animal is the musk ox, a friendly and easily tamed resident of the Arctic regions.

The musk ox has roamed the world's frozen wastes for centuries and his coat has perhaps provided warmth for Eskimoes and other residents of the far north. However, it has been only recently that serious consideration has been given to spinning and weaving or knitting the long, fine fibers in the musk ox's fleece.

These high quality fibers are beneath the shaggy, dark-brown, coarse coat of the musk-ox. From six to eight pounds of the under layer are shed during the summer and musk ox "ranchers" believe it is possible to develop a method of "combing" the fine fibers from the animal's hide rather than to depend on nature.

Thus far, the effort has been proved to be worthwhile. De-haired musk ox fiber—that is, fiber with the coarse outer hairs removed—has been found to be between Iranian and Mongolian cashmere wool in terms of quality. In terms of cost, thus far it has carried a price tag higher than cashmere.

The musk ox fiber development project is really a very modest one thus far. About 33 of the animals are presently pastured at the Univeristy of Alaska, with hopes of increasing the herd to about 100 in the next four years. In addition to the University herd, there is another maintained in natural surroundings on an island in the Bering Sea. They are cared for by the U. S. Fish and Wildlife Service.

Now that you mention it . . .

. . . . the reason most people know very little about what's going on in the world is that this information isn't included in the comic strips.

. . . . there aren't nearly enough crutches in the world for all the lame excuses.

. . . . the advantage of having a large vocabularly is that you can reject the big words and choose those you can spell.

. . . . you can say anything you want to in Russia—once!

. . . . tomorrow is one of the greatest labor-saving devices known.

. . . . with modern woman putting up such a false front, a man never knows what he's up against.

. . . . by the time you can afford to lose a golf ball most of us can't hit it that far.

. . . . a feminine woman will **never** be out of style.

. . . . nothing grieves a student more than to study the wrong lesson and learn something that he wasn't required to learn.

. . . . it's impossible for a woman to be married to the same man for 40 years. After the first twenty, he's not the same man.

. . . . a tree is an object that will stand in one place for years, then suddenly jump in front of a lady driver.

. . . . even a live wire needs good connections.

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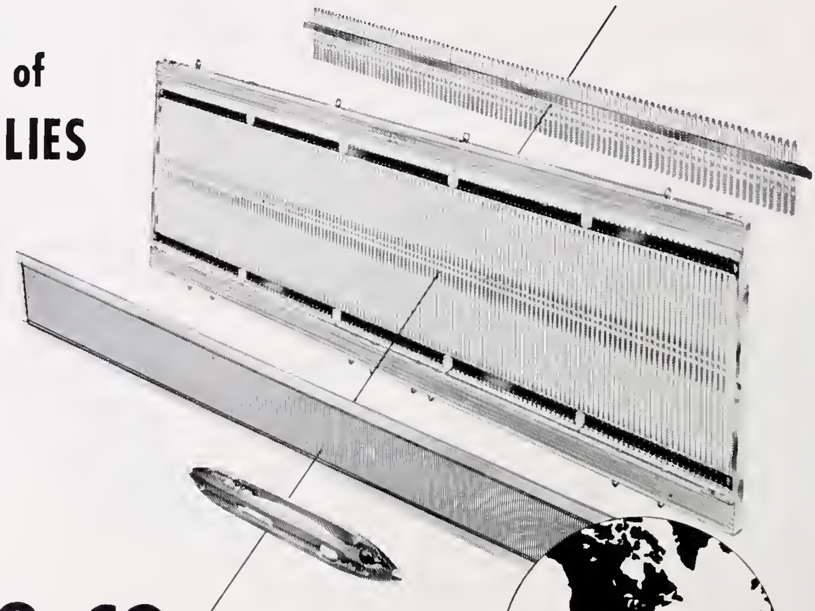
Every Stehedco Product is quality engineered to weave perfect fabrics most economically and with least possible down time or replacements.

Remember Stehedco for quality and perfection. Ask at any time to have one of our qualified Sales Engineers help you to solve your problems.



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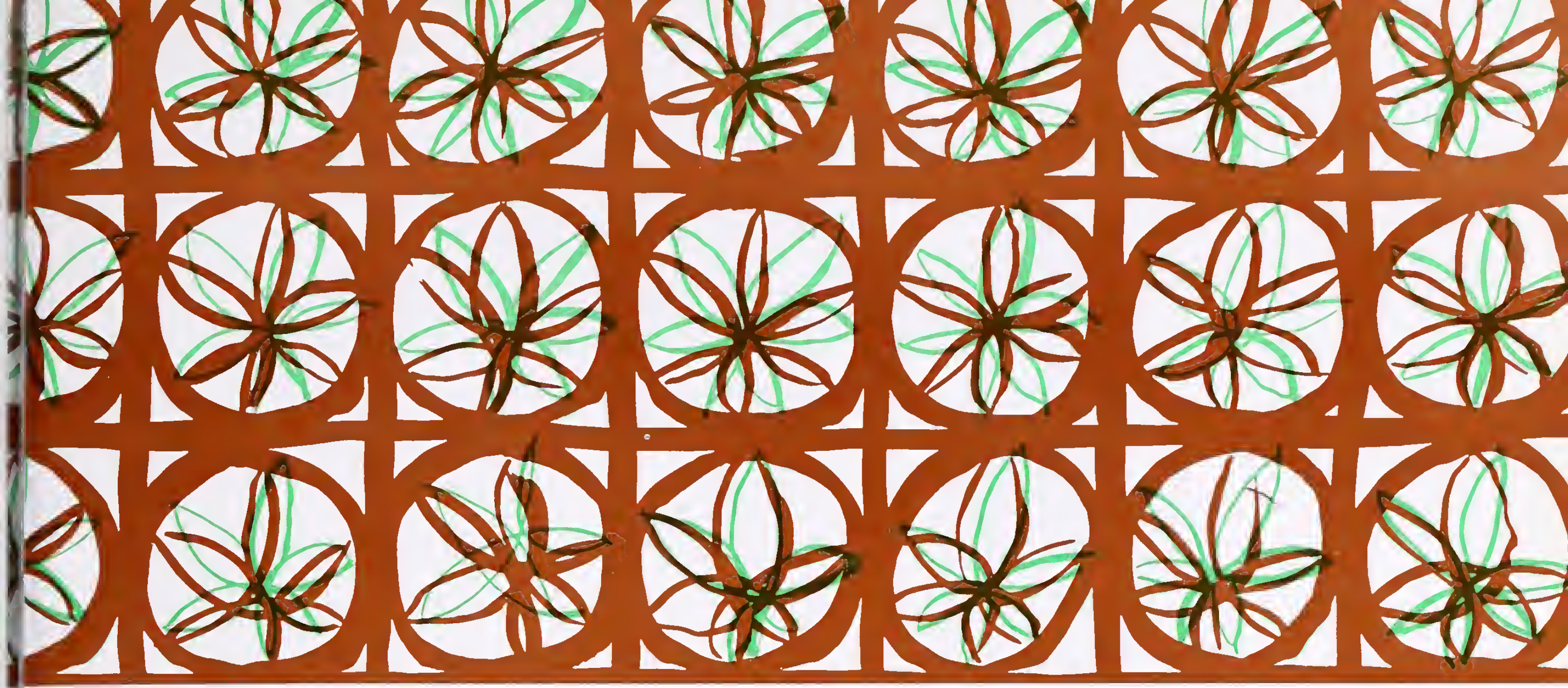

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CLEMSON UNIVERSITY

SPRING ISSUE 1965

Some talk about

FLETCHER SHUTTLES

The one complete line of Shuttles and Shuttle Parts.

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from the Editor

This being the last issue that the current staff will publish, we would like to thank the members of the faculty and those guest writers who have had their articles published during the past year. Without their help, it would have been impossible to have this publication.

It is our hope that these issues which we have published have been of interest to the students of the School of Industrial Management and Textile Science and to those already in he industry.

We would also like to thank our advertisers, without whose help the free distribution of this magazine would not be possible. Their continued support is sincerely appreciated.

The junior staff, headed by Sanders E. Goodman, a rising senior from Salisbury, North Carolina, will now take over for the next four issues.

Left to right: Wes Connelly, Henry Poston, Marshall White, Bruce Edwards

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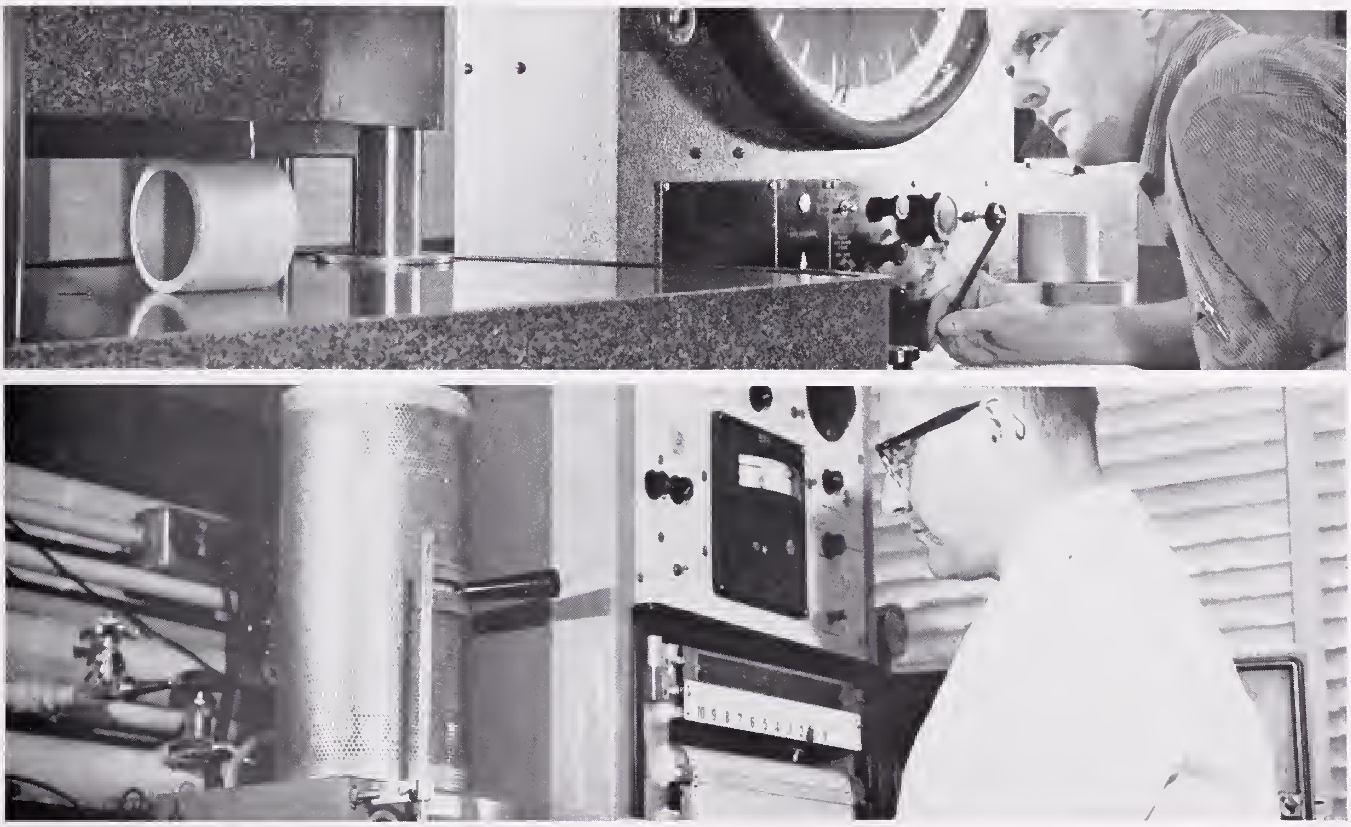

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DEFERRED CURING

By Charles D. Miller
T. C. '65

For the past few years there has been a large amount of work and research directed toward the wash and wear clothing field. Many companies have tried to perfect a truly wash-wear finish, and some have succeeded in producing resins and chemicals which impart a wrinkle-resistant characteristic to the cloth. There are numerous treatments on the market today that will give good wrinkle recovery results, but this only solves half of the wash and wear problem. Fabrics treated with these chemicals were definitely wrinkle resistant, but there was no way of pressing permanent creases into them after they had once been cured. All resin treated material was cured before it was cut into garments. This meant that the stylish creases and pleats needed in trousers and other cotton garments were almost unobtainable. Naturally, the crease retention became poorer as the wrinkle resistance became better. The crease tended to straighten out just like the wrinkles. The consumer was not getting a garment that was wash and wear. He was purchasing one that could be washed and worn but without a permanent crease.

Because of this problem, cotton was being replaced by other fibers especially in certain products that required good creases. New fibers and blends became popular in men's suiting, and other fields saw a decline in the use of cotton. These fabrics could be heat set or processed in such a way that good creases could be placed in the garments. Cotton could not match their performance, and as a result, it began to decline in use.

There have been a number of processes developed recently in hopes of overcoming this problem. Some companies experimented with cutting the garments and then treating them. This process worked fairly well, but it had so many inherent weaknesses and problems that it was not placed on a full scale production. Other companies tried curing the material and then cutting it into garments. After the garments were creased, they were sprayed or sponged with a catalyst and then re-cured. This process did not give the needed results either. Another process consisted of treating the material and then drying but not curing it. The material was then kept in frozen storage until it was needed. This cold temperature kept it from curing, but the process had many complications. Actually, it was very hard to keep the resin from curing, for most resins tend to cure on storage even at low temperatures. This process is closely related to the recently introduced deferred curing process which is patented by the Koret Company of California. The Koret Company improved upon the last method mentioned and developed what is known as the Koratron finish.

In the Koratron finish the fabric is impregnated with a resin, catalyst, softener, and other agents if needed, and then it is dried but not cured. The sensitized cloth can then be stored at temperatures around 110°F for periods up to six months. The immidazolidone resin (produced by Sun Chemical Corporation) used in the finish has a proclivity toward remaining in the uncured state until very high temperatures are reached. When the cloth is needed, it can be taken from storage, cut, and pressed into the desired shape. After the creases are in place, the materials are cured so that the creases will be permanent. The high temperature curing will cause the fabric to "set up" into a permanent shape. This process of creasing and then curing gives sharp permanent creases.

The Koratron finish is composed of an immidazolidone resin, a zinc nitrate type catalyst, mykon S.F., a softener, and a wetting agent such as Tergitol NPX (non-ionic penetrant). Other chemicals can be incorporated into the finish also. Many times flurochemical compounds and other softeners are included in the finish in order to obtain water repellence and a better hand. The resin is quite compatible with all types of chemicals and can be used in conjunction with many treatments.

The material is treated with ten to twenty-five percent resin depending on the degree of wrinkle recovery needed. After treatment, the material is dried at 200 to 300°F until it contains about eight to ten percent moisture. The material can be stored in this sensitized state until needed by the cutters. After the garments have been cut from the material and pressed, they are cured for ten minutes at 300 to 350°F.

There have been many questions about the curing temperature and time. Many people find it hard to believe that the resin needs such a hard cure. When problems in the process occur, many people falsely pick overcuring as the problem. They blame the high temperature when, actually, undercuring is the cause. Undercuring will give very poor results in the final product. It has been known to cause seam puckering, poor creases, and a shabby surface appearance. Overcuring, which is rare, can cause odor, color changes, and excessive strength loss. The garments need the total recommended amount of heat for the specifications were set up as minimums. Many people will probably try to increase the temperature and shorten the time needed for curing, but they will not obtain good results with the resin if they do. The resin treated fabrics need a certain amount of penetrating time. This time can not be shortened with higher temperatures.

The exact chemical structure of the resin has not been determined even though a tentative structure has not been decided upon from infra red absorbtion. The resin is some type of immidazolidone that contains at least one (OH) group along with the two (CH_2OH) groups. It is believed that the hydroxyl (OH) group gives the resin an added cross linkage site. At high temperatures the hydroxyl groups probably react and release water forming an ether linkage. This reaction will not occur unless high temperatures are reached. The hydroxyl group seems to give the immidazolidone extra characteristics that are beneficial in the deferred curing process.

The Koratron finish also has other qualities that are needed in a good wash and wear process. There should not be any harsh odors in the sensitized pressed or cured state. Strong odors can cause hardships to the workers and disenchantment with the consumer. The Koratron finish does not produce harsh odors in any of the three states. In fact, there is almost no odor unless overcuring occurs. The finish does not have to be after washed following curing. This makes the process faster and more efficient. The resin also has good chlorine resistance especially initially. Even though the immidazolidone is a nitrogenous reactant, it has excellent initial resistance to chlorine and good chlorine resistance after home launderings. It is generally uneffected by commercial launderings. This means that the Koratron treated fabrics can be washed and bleached without forming chloramines (—NHCl). These chloramines hydrolyze at high temperatures forming hydrochloric acid which degrades the garment. The finish gives excellent wrinkle recovery results along with all these other needed needed qualities. In fact, the finished goods seem to possess nearly all of the necessities of a good deferred curing product. Many people (consumers and researchers alike) marvel at the sharp and permanent creases of the Koratron treated garments.

There has been some trouble with shade changes on a few of the garments. Some dyes are too sensitive to be used with the Koratron finish. The high curing temperatures cause sublimation or some type of degradation in the dye molecule. This usually causes a shade that is lighter than the original. Some companies are finding that the length of storage before curing also has an effect on the amount of shade change. Because of this, it is very hard to match some colors that are to be treated with the Koratron finish.

At first there were many degradation problems with one-hundred percent cotton. The cotton fabrics suffered from abrasion at points of stress such as the cuffs. The garments were almost worn apart at the cuffs. It was discovered that in the curing process the cuffs received direct heat from the top of the curing ovens. This meant that they received a larger amount of heat than the other parts of the garment. This problem was solved with the use of shields that protect the cuffs from the direct heat. One-hundred percent cotton is used with good results in many products now. A high percentage of the dacron cotton blends is treated with Koratron also. These blends give extra strength and longevity to the garment. The Koratron finish probably has the best over-all results when applied to these blends.

The Koratron finish is beginning to give the textile industry a new look. Previously, the material was cured at the finishing plants and then sent to the garment makers to be cut and pressed. Since the situation is now reversed, the garment makers have been installing curing ovens so that they can handle these new products. Traditionally, the garment makers had nothing to do with finishing and the finishers had nothing to do with garment making, but since the advent of deferred curing many garment makers have contemplated not only curing the garments but finishing them also. The garment maker could install a small finishing operation along with the curing ovens. This finishing operation could specialize in the application of the Koratron finish. The finishing plants could add a garment making process to their system also. They are already set up for finishing and curing and they could possibly include a cutting and sewing process without too much remodeling expense. It is very possible that either the garment makers or the finishers might venture out into the others area as a result of the Koratron finish.

Through the new deferred curing process, the textile industry can give the consumer truly wash and wear garments. The consumer will have conveniences never before possible. He will be able to wash his pants (and possibly shirts, blouses, and other garments in the future) and let them dry wrinkle free with sharp creases wherever needed. Clothes finished with this process should require no more care than washing and drying, and if strict quality control regulations are followed, the consumer will put his trust in deferred curing.

GLASS: Breakthroughs Coming

One of the lesser-known members of the textile industry's fiber family is beginning to flex its developing muscles with a view toward barging into major consumer markets.

If the effort is successful, it may be that within a few years glass fiber will be an important element in the production of clothing, passenger car tires and automobile bodies. General application of glass fiber in these fields is at least several years away, according to most textile scientists, but they freely predict that the time will come when the applications can be made easily.

The movement of glass fiber toward consumer goods has been slow but steady, and it has been picking up steam in recent years.

Glass fiber drapery material has been popular for many years, and a glass fiber bedspread, made from a thinner and stronger glass yarn, is increasing in popularity. The application of glass fabrics to clothing is still largely in the experimental stage but textile researchers believe there is considerable promise in blends of glass and other fibers, particularly wool and rayon.

The major problem in developing a glass fiber fabric for clothing is apparently in the production of material which has a proper "hand" or feel. Discoveries in the past few years which have made possible very thin glass yarns are expected to lead to fabric developments incorporating large quantities of glass fibers.

Thus far, the big movement by glass fiber materials into consumer goods has been in the fast-moving boat business. About two-thirds of all pleasure boats now produced incorporate glass fiber materials in hulls and other structural features.

There has been some use of glass fiber in automobile bodies (Studebaker's Avanti and Chevrolet's Corvette) but there has been no wholesale effort thus far to adapt the material to standard production models. Glass fiber will not rust, but production costs are higher than for steel, and glass fiber manufacturers think they are at least five years away from a real breakthrough in the automobile body market.

Manufacturers of both glass fiber and passenger car tires are more optimistic in their outlook. A great deal of work has already been done on the use of glass fiber in automobile tires and some models are available in limited areas. Glass has been found to be particularly suitable for a new type of tire in which the pattern of cord and fabric runs across the face of the tire instead of around it.

While glass fiber manufacturers continue their efforts to develop larger consumer markets for their goods, the major customer for glass fiber materials is still the giant building materials industry. Glass fiber has long been popular among builders because it is strong and stable, durable, will not absorb water, takes little space and has high resistance to heat, fire and chemicals.

There are times when unexpected products result from the experiments to produce better industrial and consumer glass fiber materials. One such time was when an aircraft corporation was working with glass and plastic, and came up with a type of lightweight armor plate that is capable of stopping 30- and 50-caliber machine gun bullets.

The armor plate is now being used in Vietnam—but it is a type of glass fiber "muscle" the marketing experts had not anticipated when they first spoke of strengthening glass fiber's position in major markets.

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Professional Development Courses

The Professional Development Courses in the School of Industrial Management and Textile Science begin the eighth year in June. Below is a list of all the courses that will be offered this summer and the dates which they will be taught.

Some of the courses are offered in cooperation with various professional organizations. The responsible organizations are listed immediately below the course number. These courses are not limited to the use of the organizations shown.

JUNE 7 through 18:

P. D. 43—Basic Textile Chemistry
Palmetto Section of the American Association of Textile Chemists and Colorists

JUNE 21 through 25:

P. D. 22—Introduction to Textile Manufacturing, Dyeing and Finishing

JUNE 21 through JULY 2:

P. D. 25—Yarn Manufacturing

P. D. 38—Supervisor Development

P. D. 41—Methods Analysis and Time Study
Southern Textile Methods and Standards Association

P. D. 44—Advanced Textile Chemistry
Palmetto Section of the American Association of Textile Chemists and Colorits

JULY through 23:

P. D. 25—Yarn Manufacturing (a repeat)

P. D. 41—Methods Analysis and Time Study (a repeat)

P. D. 47—Quality Control
Palmetto Subsection, American Society for Quality Control

P. D. 56—Weaving: Fabric Design and Development

P. D. 79—Graduate Seminar in Industrial Management: A Survey of Recent Literature and Developments

Both P. D. 56 and P. D. 79 are new courses. The purpose of P. D. 56 is to familiarize the individual with basic fabric design by giving a practical working knowledge of the weaves used in the fabrication of materials. This will include a study of designs, drawing in drafts, chain drafts, reed plans and box plans. Since the course is directed toward all phases of design, a practical working knowledge of the construction of cam, dobby, jacquard, and box mechanisms will be covered. P. D. 79 is limited to holders of bachelor's degrees, awarded prior to 1960, and presently employed in managerial positions. The following areas will be specifically treated: Financial Analysis, Management Simulation (Computer Management Game), Managerial Economics, Managerial Policy, Production Control, and Quality Control.

Catalogs, with application forms, will be available in April from Prof. C. V. Wray, Sirrine Hall, Clemson University, Clemson, S. C.

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THE TEXTILE INDUSTRY HAS MANY PROBLEMS

By J. H. Marvin, Associate Professor
Yarn Manufacturing Department

Textile manufacturers are striving to produce their goods at a pre-determined cost and deliver them satisfactorily to the customer. Each mill has its own problems, however, many are similar among the various types of mill operations. In order to be more specific, let us think of a mill making ladies cotton dress goods of different styles and patterns.

Some of the general problems are found in any industry. A summary of the problems would be as follows: (1) securing the baled cotton, (2) planning and controlling the flow of the stock, (3) processing the stock properly, (4) supervision of the personnel, (5) controlling the cost, (6) upkeep of equipment, buildings and machinery and handling of supplies, (7) handling of the payroll and personnel work, (8) keeping necessary records of all the mill activities.

If we try to picture the mill in operation, we can better understand and define these problems. There are hundreds of machines and various equipment. Also these machines will be of various types because of the different processes throughout the plant. Approximately twenty-five different types of machines are used and the number of each depends on the particular process.

The kind of cotton that will make possible the cloth quality desired will be selected. The cotton fibers in the bales will be a definite size suitable for this type of goods. These bales will be secured by dealing with the cotton market. Upon their arrival at the plant they will be checked and stored until needed for processing.

Plans are made to equalize the flow of the stock through the mill so that the cloth order can be filled on a promised date. This will require each phase of the processing to be readied and occupied with the right amount of stock and completed on time. Here we are concerned with changing the baled cotton into yarns and preparing them for the weaving of these yarns into cloth. As I mentioned already, it takes many kinds of machines to handle the stock in changing it to different size yarns from a bale. The movement of the stock from one process to another requires many various types of containers and transport equipment.

Quality work throughout the mill is another daily problem. Both the mechanical and the human element is involved here. Each machine has to be set up to do its work properly. Some will require mechanical changes for making the yarns and cloth according to specifications. Everyone is also concerned with keeping the amount of stock waste to a minimum.

The supervisors have a big job in directing the work of the personnel responsible to them. The duties of each person are explained for the carrying out of the production plans and machine operations. This work, of course, has to be done effectively in order to meet the quality and cost requirements.

The machinery requires careful daily servicing for keeping it operating properly. Certainly repairs will have to be made as needed. Some parts of the machines will require replacement. There are times when new cost-saving machinery will be needed to replace the present machines. The buildings require the usual upkeep, such as painting. Over a period of years, building additions or improvemments may be needed.

The purchasing and distribution of supplies is another daily task that requires systematic requisitions.

The payroll has to be made every week for each employee to receive his earnings. The information is obtained and the amount determined to be paid each job according to the work performed.

Getting the personnel needed for the jobs and carrying on the services for their individual benefit is also carried out. Some of the individual benefits may be operation of a cafeteria and a medical room, company insurance, a bonus or profit sharing plan, a safety program and deductions from their earnings as social security dues and the like.

Throughout the mill data is recorded daily. These records are kept by the different office personnel. They will be used for many purposes such as supplying the management and supervisors with information. Also, these records will be used within the department and inter-changed with others.

Who are the people that are running the textile plants? Since my job is teaching here in the Industrial Management and Textile Science School of Clemson University, I will direct my answer to the young people of the industry and the student, past, present, and those of the future. They are handled by men that have acquired the experience and knowledge necessary to analyze. These men have developed their minds to think logically after many years of effective study. Now everyone recognizes the importance of study to train the mind to think profitably. The biggest problem of a teacher is to get the student not to just memorize facts, but use them as a basis for theoretical analysis. Maybe the student thinks the teacher is being dogmatic to give a question that requires some special thought. It requires time to develop the mind to analyze, therefore, one should consider this at an early age or in the case of a college student, at least upon entering the institution.

Several years ago, Mr. A. B. Sibley, then Vice-President of Judson Mills, one of the Deering-Milliken Mills, stated in the Bobbin and Beaker that there were more good jobs than good men. I believe the ability to think is one of the top requirements to qualify as a good man. Certainly one that can determine the best solution to the problem at hand, whether it be large or small.

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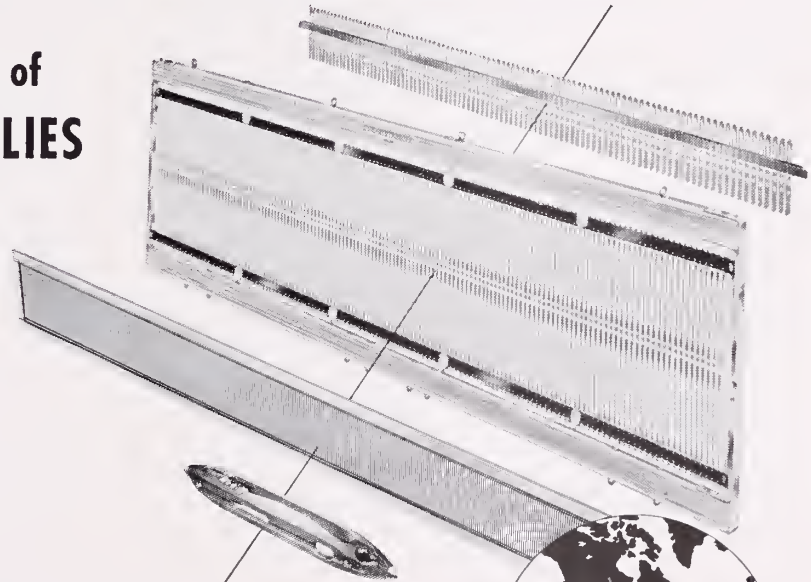

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A-6301

Glen Raven Mills Opens New Office

Glen Raven's new office building is a circular structure designed for maximum efficiency. The building stands on company property in Glen Raven, two miles north of Burlington. The circular design of the building provides maximum floor area for the minimum exterior wall length and also places all interior functions at a minimum distance from each other.

Built of attractive brick in two colors, plus steel, concrete and glass, the circular building contains over 20,000 square feet. The daring concept of the building has already caused a good deal of interest throughout the textile industry.

During the past few years, all of the mills in the Glen Raven group have been modernized and enlarged and much new equipment has been installed. At the present time, Glen Raven equipment and processes are as modern as any in the United States, according to company spokesmen.

In hosiery, Glen Raven turns out a full line of seamless and full-fashioned hose, as well as stretch support hose. There is nylon and Dacron tricot used for lingerie, loungewear and sleepwear, a stretch tricot and brushed and sueded nylon tricot. The men's wear division includes three basic slacks fabrics for boy's and men's slacks.

The item that brings a glow of pride to Glen Raven is Panti-Legs. This idea originated with Glen Raven and has proven to be a highly desirable product in the market, though at the same time it is felt that Panti-Legs also serves a need rather than being just a luxury item. It is a one-piece sheer nylon panty and stocking combined to give greater covering, eliminating the panty line that usually shows through a skirt.

Glen Raven's uniform grey goods are another source of pride to the company. These goods are turned out in Dacrons, nylon and Dacron/cotton blends. End uses for fabrics include uniforms worn by nurses, technicians, laboratory workers and waitresses.

Glen Raven's "Sunbrella" fabrics of 100% Acrilan acrylic fiber are considered by awning manufacturers to be the finest outdoor fabrics produced. They point out that "Sunbrella" fabrics are lightweight, dry quickly and are highly resistant to deterioration from sun and weather. "Sunbrella" fabrics are guaranteed by Glen Raven for five years, and are used for awnings, tentings, boat tops and a variety of outdoor furniture items.

ONE OF A SERIES OF ARTICLES ON THE DYNAMIC, EVERCHANGING TEXTILE INDUSTRY

Two products that are receiving special Glen Raven attention are Clan Crest fabrics and "Bucaroni" boucle. The boucle is the newest Glen Raven product, developed in Glen Raven's yarn division for swimwear, shirts, double-knits and sweaters. It has excellent stretch and recovery and is adaptable to many end-uses.

The Clan Crest fabric is dubbed "A Perfectly Blended Fabric." It is 50% Orlon/50% viscose, is pleatable and can be used in women's dresses and jumpers, in sportswear, robes and men's shirts. It is available finished from Glen Raven for use in end-products and is also available as piece goods.

The people at Glen Raven are carrying forward the torch lighted in 1841 when Jesse Gant started in the textile business, turning out gingham-type fabrics. When the mill was destroyed in the great war between the North and the South, his son, John Quentin Gant, came out of the army and joined Alamance Mills, the first colored goods mill in the South.

John Gant formed a partnership with Berry Davidson to build his first plant at Altamahaw. He later bought Mr. Davidson's interest and former a new partnership of Holt, Gant and Holt with Lawrence S. and Banks Holt. This partnership continued until 1925. Thus the modern Glen Raven Mills was founded.

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GREENVILLE, S. C.

From the Department of Industrial Management

In this first "column" from the desk of the IM Department Chairman the profiles of two of the department's most important groups of students will be analyzed . . . **the freshman** and the **graduate student.** Without the first there can in fact be no department . . . without the latter chances for the IM Department to grow and prosper are considerably dimished.

FRESHMAN

The primary goal and ultimate purpose of the Department of Industrial Management is to attract, retain and prepare a fair share of the **best students** entering Clemson each year. Not only is this essential for the department but it is **absolutely essential** that a stream of top level college talent be continuously fed into the mainstream of American industry. This process, of course, must **start** with the Freshman.

Below are some compiled statistics about IM Freshman entering Clemson in September of 1964.

1. Of the initial 110 reporting to Freshman orientation, 66 were from South Carolina . . . the remainder from 14 other states. By mid-term the total beginning number of new freshman was 126. Late registrants and transfers accounted for this increase.

2. In terms of preparation for college (using Freshman math as a guide) 30% required remedial mathematics, 43% were taking algebra and trigonometry and 27% were taking analytic geometry and calculus. (Note: The first math course for which IM credit is given is analytic geometry and calculus)

3. During and at the end of the first semester a number of transfers and drops occurred. Table I indicates the magnitude and direction changes. The net loss was eight freshman students.

TABLE I — IM FRESHMAN STATISTICS

1st Semester 1964-65

1. Total beginning enrollment			126
2. Transferred from IM			31
Agriculture			
Ag Education	1	Forestry	1
Animal Science	1	Ag Econ	1
Biology	1		
Arts & Sciences			
Economics	3	History	3
English	1	Unspecified	16
Engineering			
Civil	1	Ind. Education	1
Textiles	1		
3. Left School			15
4. 1st Semester students continuing in IM			80
5. Transfers to IM			24
Engineering	13	Architecture	2
Arts & Science	8	Textiles	1
6. New and Returning Students			**14**
Beginning 1st Semester			126
Beginning 2nd Semester			118
Net Loss			8

GRADUATE

At the beginning of the 1964 fall semester three students had already received the Masters Degree in Industrial Management. Their scholastic profile was: Average undergraduate grade point ratio 2.63. Average total graduate record examination scores (verbal and quantitative) was 1063. Two received undergraduate degrees from Clemson; one from Oklahoma State University.

Continuing or beginning Master's graduate work were nine students representing four colleges or universities six undergraduate fields. At mid-term one student had completed the course of study and received his graduate degree. Two students dropped out of the program and one new student entered. Two foreign students representing Norway and Korea are presently enrolled. At the present time eight students have been accepted for August 1965 enrollment in the Masters program.

In January of 1965 a new degree, the Ph.D. in Engineering Management was approved by the University. Core of this program will be graduate courses in engineering, management, economics and mathematics. Inquiries have already begun.

HOW TO SURVIVE

Of the 100 largest corporations in the United States 50 years ago, only 29 are still on the list.

The other 71 have disappeared. Some have merged with other companies. Some have shrunk below the level of the largest hundred. Others have, of course, gone out of business completely.

No one will ever know all of the reasons for 29 companies surviving while 71 others disappeared. There is, however, one reason which stands out like a beacon in the night.

The 29 companies which are still "on top" have survived and grown because of their ability to meet the challenges of a constantly and rapidly changing world. They are the ones which respect tradition but are not bound by it. They are the ones who believe their products to be the best in the business but who are constantly poking, prying and experimenting to make them even better.

A company—like an individual—needs more than imagination and ingenuity to insure success. On the other hand, 71 companies in existence 50 years ago have proved, the hard way, that you don't get very far without the ability to meet and master the challenge of changing times.

Adams
Durst
Harris
Ninety-Six

Chalmers
Greenwood
Sloan
Mathews

Plants

75 Years of Progress
1889 – 1964

GREENWOOD
MILLS

"FABRICS WITH THE
CHARACTER OF QUALITY"

Outstanding Seniors . . .

CHARLES DALTON MILLER

Charles Dalton Miller, a twenty-one year old Textile Chemistry major, is a native of York, South Carolina. He received a Ciba Scholarship to aid with his expenses at Clemson.

On campus Charles has been active in several organizations including the American Association of Textile Chemists and Colorists, Phi Kappa Delta Social Fraternity, Phi Psi and Society for Advancement of Management. He serves as president of AATCC and junior warden of Phi Psi. He was a member of the Taps junior staff and is an active participant in intramural sports.

Charles has gained valuable experience in textile chemistry by working during the summers with various chemical corporations. He worked one summer each with General Dye Corporation, Sullivan Southern, and Sun Chemical Corporation.

After graduation Charles plans to go to work with some chemical corporation and in two or three years he would like to attend graduate school.

BOBBY J. PARTRIDGE

Bobby J. Partridge is a twenty-two year old native of Calhoun Falls, South Carolina. He is majoring in Industrial Management and has selected textiles as his option.

Bobby has been very active in several organizations on campus. He is a member of Phi Kappa Phi Honor Society, Iota Mu Sigma Honor Society, the Society for Advancement of Management, and the American Association of Textile Technology. He is a senior Senator and serves on the Judiciary committee.

To aid with his expenses, he has received a Burlington Foundation Scholarship. He has received honors for every semester at Clemson.

Bobby plans to attend graduate school after graduation but as yet he has not decided upon the institution.

BOBBY LEE WATERS

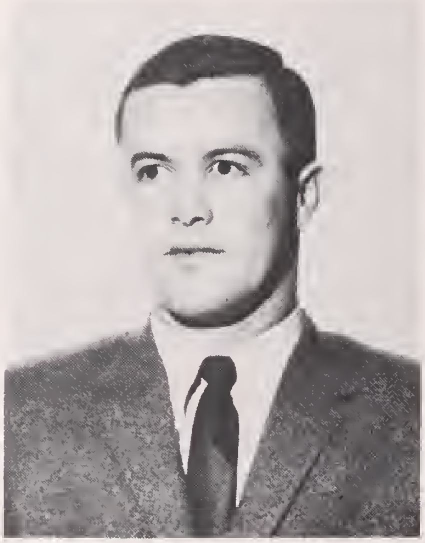
Bobby Lee Waters is a twenty-two year old Textile Management major from Calhoun Falls, South Carolina. He has received honors every semester at Clemson.

Bobby is enrolled in Army ROTC and is a Distinguished Military Student. He presently serves as the executive officer for E Company. He will receive a commission upon graduation in May.

To aid with his expenses, Bobby has received a scholarship from J. P. Stevens and Company.

Bobby has gained valuable experience in the textile industry by working with Calhoun Mills, a division of Burlington Industries, in Calhoun Falls, South Carolina. He has worked there for the past seven summers as well as on weekends and holidays.

After graduation, Bobby plans to accept a position with Burlington Industries, but he will have to interrupt his training program to serve a two-year tour of duty in the Army.



REVIEW AND OUTLOOK

The textile industry's prospects for a good year during 1965 are excellent, continuing the period of dramatic improvement begun last year, according to the industry's chief spokesman, President William E. Reid of American Textile Manufacturers Institute.

Mr. Reid, who is also president of Riegel Textile Corporation, said that the industry, for the first time in many years, is keeping pace with the nation's overall economy, sharing with other industries the benefits stemming from a faster climbing population, more employment and rising incomes.

Among the major indicators of the textile industry's currently good position and favorable outlook are employment and wages. Mr. Reid said total textile employment increased about 3,300 between August and October 1964 and by about 11,00 from October 1963 to October 1964, reversing a long downward trend in textile employment.

The October 1964 total of textile jobs was 908,600 and the rate of increase was 30 per cent higher than the rate for all other manufacturing industries. Thus, the net effect, Mr. Reid indicated, is that the textile industry is providing more and better-paying jobs than ever before.

In addition to more and better jobs, Mr. Reid said the industry's member companies are providing better machinery and equipment for its production processes and personnel.

"Textile firms poured an estimated $750-million into modernization and expansion of plants in 1964," Mr. Reid said, citing figures compiled by the U. S. Department of Commerce. He also said that modernization and expansion spending during the first quarter of 1955 will be at an annual rate of $950-million, continuing the textile industry's record of spending more of its net worth for modern machinery, equipment and plants than any other major American industry.

Mr. Reid also said that demand for textile products rose substantially during 1964 and that fiber consumption at the mill level was at an all-time high. In addition, he said research is getting increased emphasis and that more and better new products are resulting from new and improved machines.

"There can be no question that the single most important factor in the 1964 success was the coming of the one-price cotton law," Mr. Reid said. The law, passed in April, provides American mills with the ability to buy American-grown cotton at the same price it is sold to foreign manufacturers.

"The U. S. Department of Agriculture has estimated cotton consumption for the 1964-1965 crop year at 9.7 million bales, an increase of more than a million bales over the previous year. This increase is largely attributable to the one-price cotton policy," Mr. Reid said.

"With all these gains in the industry and particularly in the proven benefits of one-price cotton, it would seem obvious that the future health of the industry depends in large measure on continuation of some form of one-price cotton program when the present law expires," he added.

Mr. Reid said that the one-price cotton law has made it possible for American textile companies to compete with foreign manufacturers at the raw cotton level and that international trade agreements for cotton textiles have limited the advantage foreign manufacturers hold with their vastly lower wage rates.

"The textile industry now enjoys its first general prosperity in many years," Mr. Reid concluded. "To fulfill the promise of 1965 and beyond, the industry will have to continue its progress in technique, management and marketing, and it must fight to keep American mills in fair competition with the rest of the world."

Chatham's New Blanket Process

By Thomas D. Efland, Associate Dean
School of Industrial Management and Textile Science

Nothing is ever really new; however, old ideas rejuvenated with a fresh approach and expertly executed can give a company a new product. Needle punch methods of producing fabrics date back to patents as early as 1868 in the U. S. issued to Crossley on his crude machine and they have been issued frequently to others since as machine improvements have been made and more variety developed in the fabric. The latest step in this evolutionary cycle is covered by patent 3,112,552 issued to Dr. Alexander M. Smith of the Chatham Blanket Company.

Dr. Smith's invention embodies the basic component of barbed needles as are used in all other needle punch machines, but he has configured his machine to cause these needles to more effectively accomplish the locking of the fibers in a mat. Rather than drive the needles into the fiber mass normal to its surface as do most previous machines, the needles enter at an acute angle to the surface. By driving the tufts of fibers in at an angle, a second set of needles operating from the opposite side of the fiber mass can act in coordination so that the loops of fiber can actually be interlooped with each other similar to the chains in a knitted fabric. Earlier machines were designed with one needle platen, thus the fiber layer had to be punched from the opposite side on successive passes through the machine.

Interlocking the fibers by the geometrically arranged needles increases the structural integrity of the fabric in the widthwise and lengthwise direction as well as preventing separation of the fiber layers. Older needled fabrics usually required a woven scrim to enhance the lengthwise and widthwise strength and were usually plagued by a strong tendency to delaminate. Such inherent faults, now overcome by the interlooping of the fiber tufts, have to date, prevented the wide use of needled fabrics for many end uses.

Perhaps as important as the invention itself, the excellent engineering of the needling unit makes the process practicable by incorporating four needling stations in the same high speed machine. The drive mechanism advances the material through the unit at a rate coordinated with the needle strokes to give the patented interlocking of the loops. The needle platens operate at speeds in excess of 750 strokes per minute which with their 13,000 pairs of needles gives a punch density of 2200 to 2300 punches per square inch of material.

The needle platens are pivotally mounted with a needle bed at the end of the rocker arm. The mass is kept to a minimum by embedding the needles in fiber glass fabric and epoxy resin rather than using the older methods of wood or metal plates. The needle beds actually oscillate between air springs which extend the entire length of the needle bed and prevent deflection in the very light weight plates. The rocker arm method of operating the needles allows for having equal masses moving in equal and opposite directions which cuts down vibration usually developed in large oscillating machines. The air springs which stop the back throw of the needle plates can be varied in stiffness by the amount of air pressure in them, thus it is possible to tune the system by using a pressure regulator to vary the pressure. Once the unit is at operating speed and the air pressure has been adjusted to the tuned value, it is only necessary to supply enough power to overcome the machine friction and the energy required to force the needles into the fiber mass.

The needling machine has been incorporated into a system at Chatham Blanket Company to produce material for blankets directly from fiber without spinning or weaving. The process would fall in the general category of non-woven fabrics and the trademark "Fiberwoven" has been applied by the company. This promotes a positive image rather than the negative one implied by the term non-woven. However, there is no weaving involved in the process. The product produced by the system before finishing resembles a heavy dense felt of the width necessary for fabricating blankets.

The line begins with woolen cards feeding onto a conveyer belt with a traversing device laying the webs in a crisscross fashion to give considerable lateral orientation to the fibers and to give a sufficient linear density for the blanket to be produced. Two or more 100-inch cards are used or four 60-inch cards. A series of threads are laid between the fiber layers to help transport the fiber forward although satisfactory material can be produced without these. The fiber matrix is transported into the needling machine where the four stations impart sufficient penetrations at one pass and the fabric is rolled for the finishing process in units up to one thousand pounds.

In finishing, the fabric is napped on conventional equipment but fewer passes are required and much less energy is used to produce a lofty surface than on a woven material. Dyeing finishing and fabrication are similar to conventional blanket manufacturing except that the much larger rolls of fabric facilitate the finishing through lower handling costs and improved cutting efficiency.

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COMPANY

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Manufacturing A Full Line of
Textile Processing Chemicals

60 PARK PLACE
Newark, New Jersey

WHY SPEND SO MUCH?

The textile industry's various member companies are expected to spend a total of $760 million this year for new plants and equipment.

That's an awful lot of money.

It's far more than the government will allow as a tax credit on buildings and machinery.

It's a big chunk of the total profit the industry made last year when, as a whole, textile companies could call less than three per cent of their total sales receipts "free and clear".

It's an amount greater than the sales of all but one of the many American textile companies.

Why go through all the agony of planning to spend that much money if it's more than the government allows for depreciation, more than the total sales of every individual company except one, a measurable piece of total industry profits?

Why spend it?

For nearly 175 years, the textile industry has been developing itself as a modern, progressive, dynamic industry.

It intends to stay that way.

Industrial Management Undergraduate Research Abstracts

The following undergraduate research was completed by Industrial Management students during the fall semester 1964-1965.

The Elberton Granite Industry

John S. Ayers

The purpose of this research was to investigate the Granite Industry in the relatively small town of Elberton, Georgia, and to determine its importance to that community. After making the study, I have reached the conclusion that Elberton revolves around the granite industry and is very dependent upon it.

The granite industry is by far the most important in Elberton. Approximately seventy percent of the non-farm workers there are employed in some capacity by the granite quarries or plants. These workers are paid about five and one-half million dollars each year. It is also the largest industry in Elberton. Over one-third of all monumental granite produced annually in the United States come from Elberton. There are a total of ninety-nine companies actively engaged in the granite industry in some way.

Granite has been the center of Elberton's growth for many years. Supported by this booming and progressive industry, Elberton's future looks very prosperious. Elberton is truly the "Granite City of the World."

A Study of Harvesting and Transporting Containers for the South Carolina Grape Crop

James L. Leslie, Jr.

During the months of June and August 1965, an experiment was conducted in the South Carolina grape fields to determine the relative damage and change in sugar content of grapes shipped in five different containers and the relative ease of handling of these containers in an effort to select a superior container for use by the South Carolina grape farmers.

Samples were taken in the field before the grapes were placed in the experimental containers and again at the processing plant after the grapes had weathered the entire harvest and transportation process. Each of these samples was analyzed for damage and sugar content and the difference between the field sample and the sample taken at the processing plant was computed for each container. Any change in damage and sugar content was assumed to have occurred while the grapes were in the shipping containers. This data was analyzed in such a manner as to remove such extraneous variables as location of vineyards (distance of haul), time elapsed between picking and processing and different handling techniques of growers. This data indicated that although there was significant variation in sugar content with respect to time elapsed between picking and processing and with respect to location of vineyards, there was no significant variation of sugar content of grapes transported in the five experimental containers. The damage data, however, indicated that there was significant variation in the damage to the grapes transported in the various experimental containers. The plastic lug and the wooden lug were significantly lower in percent damaged than the peach field box, the bushel basket, and the 3/4 bushel basket.

The observations of the relative handling ease indicated that the use of the peach field box and the grape lug resulted in from three to five times the dead weight of that involved with the use of the plastic lug. The necessity of placing lids on baskets before stacking in the truck and also the removal of the lids before dumping at the processing plant resulted in definite labor inefficiencies for the basket. The plastic lug needed no lid, it was light and readily accepted by the pickers and loading crews alike. The stacking characteristics of the plastic are excellent, making it easily handled by dydraulic fork lifts.

It can be concluded that, from the standpoint of lower damage and higher efficiency of handling, the plastic lug is best suited of the five tested containers for use by the South Carolina grape growers.

Profit Potential Analysis of a Going Concern

Thomas C. Hamm

An attempt has been made to examine a going concern that has been mismanaged to the point of perpetual financial losses. The basic assumption of this paper was that good management could correct this situation and cause the firm to produce a profit. The examination was to discover the profit potential of the firm and to find the cost of reaching this potential.

It was noted that this going concern could naturally be divided into three separate facilities. These are in order taken up, the hotel facility, the restaurant facility, and the rentable property facility. Based upon discussion with many business men located in the same city with this firm it was found that about $23,000.00 was needed to renovate the hotel facility. Based upon projection of the business volume of local competition, the hotel's business volume was estimated. After deducting known operating cost, adjusted for the increase in business, from the gross revenue the net profit was determined for the hotel facility.

The analysis of the restaurant was conducted in much the same way. The cost of improving this facility was estimated to be approximately $8,000.00. Gross revenue was based here as in the analysis of the hotel facility on local competition business volume; however, actual cost data was not available. To determine costs, a similar restaurant was consulted in a similar town. These cost figures along with verification from other sources were used to obtain net profit for the restaurant facility.

The rentable property facility's analysis was conducted with actual rent figures projected for that part of the facility that was vacant. Renovation cost was obtained from local contractor and found to be approximately $5,000.00. Miscellaneous cost items such as maintenance, insurance, taxes and so on were deducted from this part of the enterprise.

Various related questions were considered, such as the cost of reshaping the public image of this long down-graded firm. Another question was the effects of the by-pass being presently constructed around the city. Outdoor advertising seems to be the answer to the by-pass problem. While newspaper and radio campaigns seems to be the answer to the image problem.

After all figures were in and all computations made it was found that $38,005.00 needed to be spent improving the facilities. It was likewise found that profit of $42,616.95 could be expected from each year's operation of the facilities.

Using the appraised value of the building and equipment and adding the capital outlays currently needed and dividing this into the expected net profit the annual return on investment was found to be 21.8 percent.

Finally the question was raised as to whether or not this rate of return justified the risk. The answer to this question must come from the prospective investor.

Sale-Leaseback Transactions

David J. Weeks

Finance is one of the most challenging fields in our modern day society. Through the different methods and techniques of finance, millions of dollars are made and lost every year. Rules are set down to follow, but they are not always fully dependable. Only through research, long years of experience, and the instinct of knowing the right answer at the right time, can one determine which decision should be made, and when they are often-times wrong.

This report delves into one of the many financing techniques which are at the disposal of the business world. Just mentioning the Sale-leaseback Transaction proposes a decision to be made. The party (usually a business rather than an individual) has to decide whether to place a large sum of capital into fixed assets or to lease them. The report of course leans toward the sale-leaseback of assets, however, both sides of the picture are presented.

Volume I gives a thorough understanding of the topic. It shows precisely how this type of financing works, and why it is good or bad for certain parties concerned.

Volume II goes into the accounting aspects of the transaction. It shows how the companies would handle the transaction on their books. Also, there is a short section on alternatives to the sale-leaseback transaction.

I found the research on this topic to be of great interest. It has its disadvantages, but the benefits that can be realized are fantastic. For a company that has to put most of their capital into disposable goods, the sale-leaseback is an excellent way to obtain needed assets (land, buildings, and etc.). On the other hand, it is a fine investment for parties that have a large sum of excess capital. They own the assets while in reality someone else is paying for them, and at the same time they are drawing interest on their investment that is higher than they can get through most other types of investment.

Legacy Of An Indian

The department store customer who picks his way through a selection of cotton shirts to choose one with "Pima Cotton" label may not realize it but he is adding another chapter to a memorial for a man nobody knows.

The unknown man is an Indian. His name has never been a part of recorded history, and nobody knows when he lived. Historians are fairly certain, however, that he lived in Arizona — specifically Northern Arizona.

The general picture of Arizona Indians of the past is one of a half-naked, painted young buck astride a galloping pony swooping down on an isolated ranch or a California-bound wagon train.

That picture could hardly be farther from an accurate one for the obscure Indian for whom Pima cotton shirts are a memorial. He was a farmer. Actually, he was a farmer in about the sorriest sort of farm land—harsh, dry, cool land with a short growing season.

But he was a good farmer. He was the first cotton farmer in what has become the United States.

Research, excavations, and other physical evidence show that Indians in the Southwest were growing, spinning and weaving cotton several hundred years before the New World was discovered. Spanish conquistadores searching for gold in 1539 found the natives in well-made cotton garments. Cotton cloth has been recovered from burial sites of cliff-dwelling tribes who lived even before that date.

A noted Arizona cotton breeder once pointed out that members of the Hopi tribe stopped only a few years ago in their practice of raising isolated patches of cotton in the state's high, cool northern regions. He cited the Hopi cotton as an example of the adaptability of plants to environment, saying "Instead of growing tall on a strong stalk, Hopi cotton had a weak stem which caused it to lie on the ground where the warmth of the earth made survival and production of lint possible."

Because of its ability to survive under adverse conditions, Hopi cotton is still being studied by cotton breeders.

Other observers of Indian cotton did not restrict their interest to its hardiness.

The head of the U. S. Boundary Commission reported in 1854 that he saw cotton being raised by Pima and Maricopa Indians that was equal to the best Sea Island cotton. Another man, ten years later, said that cotton flourished with "remarkable luxuriance" in Pima villages.

The agricultural skill of the Southwest's old Indian cotton farmers is especially noteworthy. While it is true that their cotton adapted itself to the conditions at hand, it was still necessary for the Indians to devise an irrigation system and some sort of crop rotation and planting schedules that took the character of the land and the short growing season into consideration.

But for all its glory, the Indian cotton business never did blossom. It remained for the white man to turn Arizona cotton into a commercial crop, beginning around 1912 when Arizona was admitted to the Union.

However, just the knowledge that some obscure Indian may have made the Arizona highlands the nation's oldest cotton producing area—pre-dating even the traditional cotton country of the Deep South—conjures up some second thoughts about the old days.

That stately Indian standing on an old, forgotten butte gazing toward the distant horizon possibly had his mind on things other than Spanish conquistadores or wagon trains or horse soldiers. He may have been trying to figure out where to put next year's crop, or how to meet the economic threat posed by upstart cotton planters in far-off Mississippi.

Demand For College Graduates Grows As Textile Field Broadens

Clemson University graduates for decades have been among the higher echelons of administration and research department in practically every U. S. textile firm. "We must keep the pipeline of talent flowing, however, and the School of Industrial Management and Textile Science is doing just that," says Dean Wallace D. Trevillian.

"Majors in such fields as mathematics, management, engineering, physics, and chemistry—all have unique opportunities awaiting them in this old but dynamic industry. The possible spectrum of inventiveness includes concepts not yet dreamed and runs from a better fishing line to an improved space suit for an evening on the moon."

Any statistics to reflect the rapid developments of the textile industry are out of date before they can can be published. The same is true regarding Clemson's growth and developments. "We would have to publish a catalogue daily to be really up to date the dean said.

"A subjective gage of the industry's remarkable achievements can be understood partially by simply riding through the Carolinas and witnessing first hand the new factories in the fields. Increased capital spending, mergers, effective cotton legislation, research, and the status of the economy as a whole have all contributed to a resurgence. The contribution of these factors coupled with talented executives and professional management have speeded up the renascence of the industry.

While the industry is employing and needs engineers, scientists, and management majors, the hard core of educational responsibility for the industry remains with the textile schools. The textile major per se at Clemson University may select an undergraduate curriculum of a bachelor of science; in addition to a basic education this curriculum concentrates on the principles of science, engineering and technology as it relates to textiles.

"On the other hand, he might choose the textile chemistry undergraduate curriculum, making it possible to continue for the master's degree and the Ph.D. in chemistry with a major in textile chemistry. Other students may select an undegraduate degree in management with a secondary concentration in advanced textile technology."

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Kotten Korner

First Drunk: Say, know what time it is?

Second Drunk: Yeah.

First Drunk: Thanks.

* * * * * *

After a rather exciting date with a sweet young thing, her escort, a bit anxious, asked: Do you tell your mother everything you do?"

She looked at him and said: "Certainly not. Mother doesn't give a hoot about what I do. It's my husband who's so inquisitive."

* * * * * *

Why is Mr. Smith pacing up and down his front porch?

He's awfully worried about his wife.

Is that so? What does she have?

The car.

* * * * * *

Physician, to nervous student: The best thing for you to do is to give up smoking, drinking and late hours.

Student: I don't feel that I deserve the best. What is your second best solution?

* * * * * *

Nurse (in mental hospital): There is a man outside who wants to know if we have lost any male patients.

Doctor: Why?

Nurse: He says that someone has run off with his wife.

* * * * * *

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in Textile Processing

C

Corobex (Kôr ′a-bex)

A durable anti-bacterial additive for textiles. Provides fixed, lasting protection against germs, mildew, perspiration odors and other odors of bacterial origin.

Easily applied during dyeing or finishing operations. Will cause no shade change in dyed and printed colors, no yellowing of whites. Does not affect the hand of the finished goods. Compatible with most types of finishing materials.

D

Discolite® (dĭs′kō·līte)

Concentrated sodium sulphoxylate formaldehyde available in lump, pea, rice or powder form.

A powerful reducing agent, stable at high temperatures. Widely used to effect reduction and solution of vat colors, and for discharge effects when applied to colored grounds. Effective when mixed with vat colors and discharge pastes wherever the reducing agent must retain its reducing power after being dried into the fabric.

Dispersall (dĭs·pûr′sal)

A long chain ethylene oxide condensate in the form of a colorless, neutral, somewhat viscous liquid. Fully resistant to hard water, and miscible with water in all proportions. A retardant and leveling assistant in vat dyeing.

Used widely as a dispersing agent in dyeing synthetic fibers with disperse colors and for fast color salts and bases in Napthol dyeing and printing.

Effective in stripping to prevent redeposition of the color on stripped goods.

N

Neofinish (Ne/.O.Finish)

Non-Ionic softener dispersible in hot water, suitable for all textile fibres, both natural and synthetic. Compatible with all types of finishing materials, including resin finishes. No development of color or odor in goods finished with Neofinish, even in storage. No yellowing at time of application.

Neowet (nē′ō·wĕt)

Complex Polyethelene Ether in the form of a pale yellow, slightly viscous liquid.

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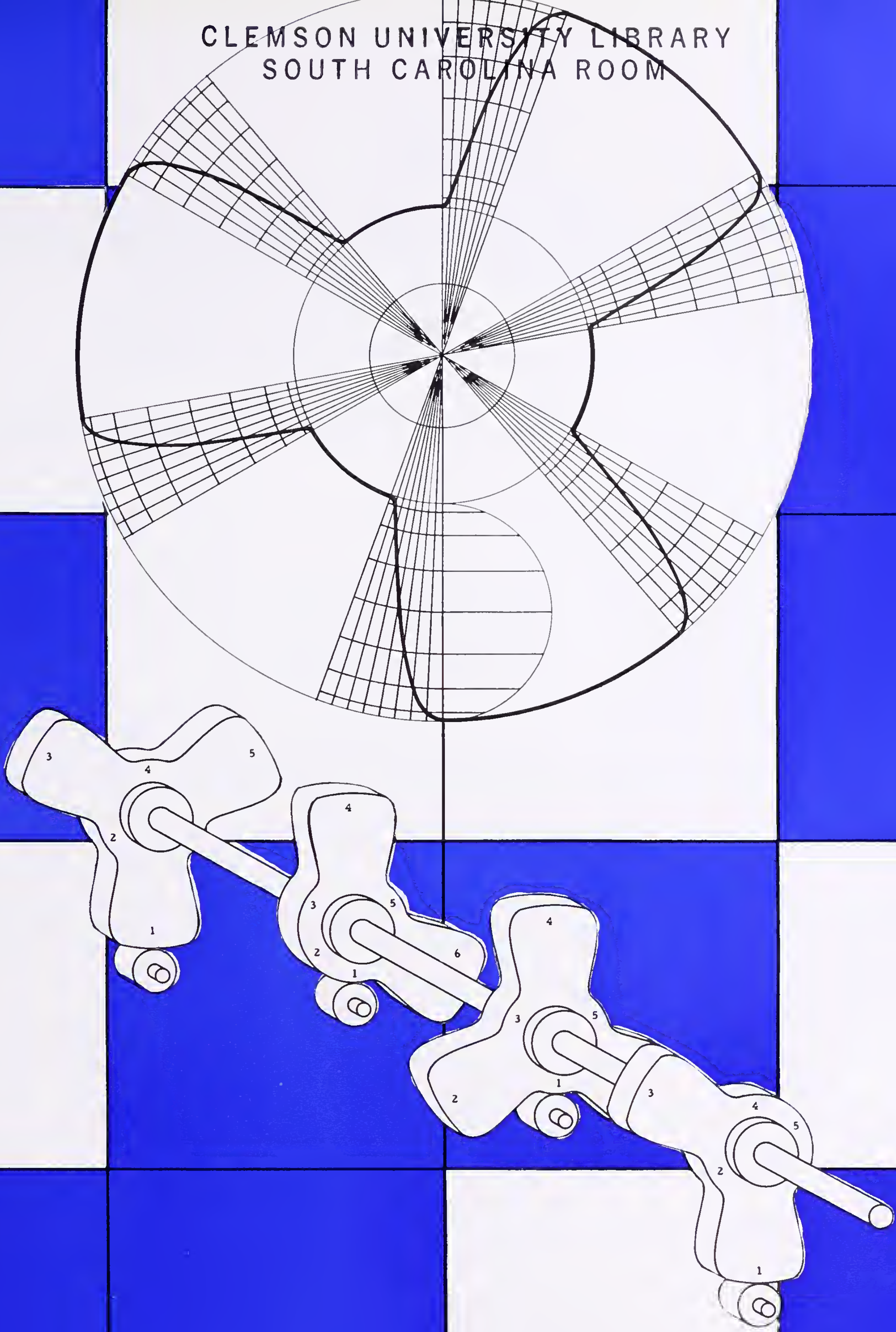

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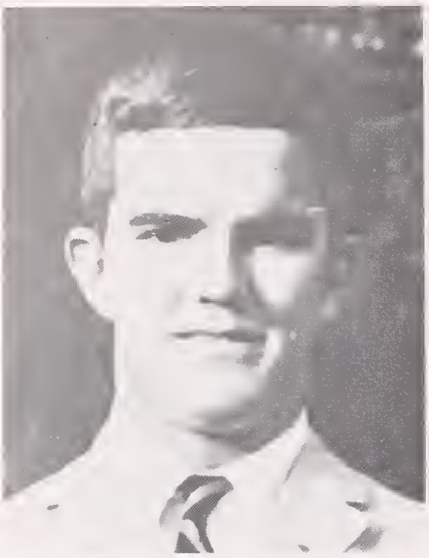

from the Editor

In this, the first issue by the new staff, we think we have a good variety of articles. There is a report on this year's Professional Development Program and also several research abstracts.

The new staff would like to express its appreciation to the members of the old staff and faculty whose patient help made this issue possible. We hope that our tenure of service will be as successful and rewarding as those of the past.

Our thanks go out to the Textile Quality Control Association for their generous gift of one hundred dollars to be used for the purchasing of new books for the Sirrine Library.

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FUNDAMENTALS OF COLOR MEASUREMENT

Edward S. Olson
Associate Professor of Textile Chemistry

The textile industry has for many years worked on the periphery of the requirements to measure color. The past ten years has witnessed a rise in the interest of color measurement, specification of color, and the establishment of acceptable tolerances. For the present it is possible that the state of the industry may be characterized in three different levels. Mills in the first category are either unaware of the strides being made in color measurement or are completely ignoring it. The second category are those attempting to evaluate various measuring instruments to determine the feasibility of the installation of a color measurement system in the mill. The third type of mill are those having made a sizeable investment in one or more different instruments and have found that these instruments are acceptable for their individual purposes. These mills are now attempting to set up systems to constantly monitor and correct conditions and dyestuffs being applied to a textile fabric in a continuous manner.

In general, light falling upon a transparent body will be partially reflected, partially absorbed, and partially transmitted. In the case of opaque bodies it is found that radiant energy may be absorbed and reflected but not transmitted. The common denominator of both materials is the characteristic of absorption so that while measuring solid bodies, such as textile fabrics, one is primarily concerned with the magnitude of reflection. On the other hand, when solutions are measured, the primary concern is the transmission qualities of the solution. It should be agreed upon that a certain magnitude of radiant energy falls upon the textile surface. In order to account for the total energy, a certain proportion of the light is absorbed or scattered as the rest is reflected. For solution measurements a certain proportion of the light is absorbed while the part not absorbed must be transmitted. Since absorption is the common denominator for both systems, it must be recognized that absorption, in its simplest terms, simply removes certain wavelengths of light from the total light falling upon the surface. Through this property our terms of colors and colorants are defined.

When sunlight falls upon different surfaces, one recognizes that these surfaces are either blue, green, yellow, or red, as the case may be. Since the same light is incident upon the different surfaces, it is concluded that the color observed is due to the constitution of light itself. Certain spectrum regions are absorbed while others are reflected. A colorant is generally regarded as being dyestuff or other absorber. Different hues are the result of a different chemical constitutions. The reason that a dyestuff is red is because the colorant absorbs portions of the visible spectrum while reflecting or transmitting red. The red that we see is a function of the incident light upon the surface.

Whether we measure color by visual or instrumental methods, four basic requirements are essential in either case. The four essentials are:

1. illuminant,
2. object,
3. receptor, and
4. interceptor.

Each of these four elements will be considered in its capacity to contribute to a color measurement system in the order listed above. The physical attributes of color and color measurement are within the concept of electromagnetic energy. The electromagnetic spectrum is, in its simplest terms, a continuous extension of wavelengths from that of long form radiant waves through cosmic energy. At an intermediate point between 400 to 700 millimicrons the visible portion of the spectrum is located. Since the human eye responds in this area, our primary concern is with the quality and spectral attributes of the radiant energy within this boundary.

The infrared is located in the long wavelength side of the electromagnetic spectrum. In the short wavelength portion of the visible spectrum is that portion which we define as the ultra violet. Both of these areas—the infrared and the ultra violet—have for many years been accepted, recognized, and used for chemical qualitative and quantitative analysis. The radiant energy emitted in the area of the visible spectrum is intermediate to that of the infrared and ultra violet. In the portion to which the human eye is sensitive, the basic energy characteristics are similar.

Since the electromagnetic spectrum is fundamentally one continuous progression, the principle variation is that of wavelength or its reciprocal **frequency.** Many of the properties of light can be accounted for by considering it as a wave motion which is also capable of mathematical expression and therefore of quantitative and qualitative treatment. This mathematical expression may be expressed as the frequency = velocity/wavelength. Figure 1 is a representation of the wave motion of light. It is to be noted that the distance a-a^1 is the wavelength traveling in the direction d-d^1. The wavelength, therefore, is the distance between repeats of the wave. The sine wave depicted in Figure 1 is the curve given by a particle moving in the direction u-u^1 for a distance on either side of this axis. This particle also moves at constant speed approximating 3×10^{10} cm/sec.

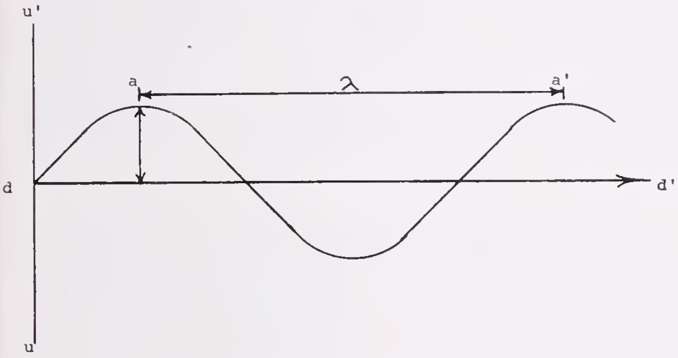

Figure 1.—The wave motion of light.

When a beam of light passes through a prism, light is refracted and emerges as a continuous spectrum containing all colors except purple. The angle of light least bent or refracted is that of the longest wavelength, approximating 700 millimicrons, and is the red end of the spectrum. The light at the other end of the spectrum is that which has been bent the greatest and is violet. When white light is passed through a prism and separated into various colors, these colors can be recondensed and emitted as white light. Upon this concept is based the additive color system. The additive system selects spectral colors in the form of light which when added together, match other colors. This concept is part of Grassam's Laws.

In direct contrast to the additive system is that of the subtractive system. The subtractive is based upon the fact absorption of light by colorants. Colorants are classified as being dyestuffs, pigments or other agents capable of absorbing selected areas of the visible spectrum and reflecting those not absorbed. A red dyestuff or colorant absorbs selected quantities of violet, blue and green while reflecting the red.

It is axiomatic that the light source used to view a given sample must contain all of the spectral colors. A sodium lamp emits its light in the 580-590 millimicron region of the spectrum. It will be observed that differently dyed samples of fabric (pink, grey, blue, and tan) are essentially ecru under these conditions. True colors are achieved only when lights containing all colors are turned on. In order to properly view a sample, lights of a distributed energy level containing all elements of the spectrum are essential for the correct assessment of shade.

The relative energy of a light source must be considered at any time samples are to be matched. For color maesurement three light sources have been standardized and are known as illuminants A, B, and C. Illuminant A is a tungsten incandescent light source operating at 2,850°K. Illuminant B represents noon sunlight operating at 5,000°K. Illuminant C is that of daylight having an over cast sky operating at 6,800°K. The Figure 2 represents the curve of these illuminants and compares the relative energy of each throughout the visible spectrum of 400 - 700 millimicrons. A comparison of these curves indicates that illuminant A contains a relatively low level ultra violet and blue with excess amounts of energy in the red end of the spectrum. On the other hand, illuminant C contains greater amounts of energy in the blue and green areas of the spectrum with lower quantities in the red region. If two samples of fabric were compared after being dyed using identical systems, no color differences should be readily apparent when either light source is used. However, in actual practice this is not what happens. While the same substrate may be used, such as 160 x 60 cotton broadcloth, in order to match a given shade, different dyestuffs have been used. As a result of this, if one of the dyestuffs produced a red flare in the 650 millimicron region and the other did not, differences in dyeing would readily be observed when illuminant A was the incident light. If differences existed on the other end of the spectrum, at 450 millimicrons, differences would be readily discernible when illuminant C was used. It is, therefore, necessary that samples must be viewed under the same lamps of relative energy in both the dyehouse as well as in the salesroom. Unfortunately, most of the color matches made in the dyehouse are metameric matches. (Metamerism occurs when two or more samples, spectrally dissimilar match visually under a given light source.) These samples when compared by spectrophotometric methods show that curve dissimilarities exist. On the other hand, if two samples are compared by the same method and the curves are identical, the two samples match. This, in all probability, will exist only when identical dyestuffs are used to dye identical fabrics. The curve shape of a given dyestuff can be utilized to identify individual dyestuffs.

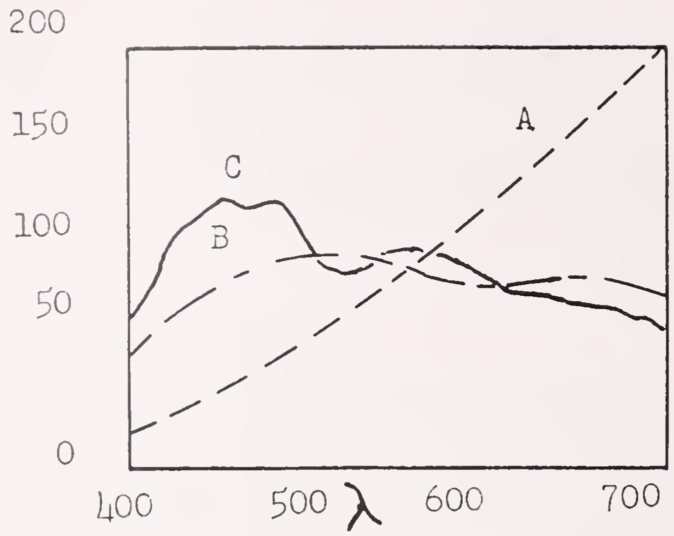

Figure 2.—Illuminants A, B, and C

The incident light upon the surface of an object is important. Of equal importance is the interpretation and identification of the color by the observer. While the response of given observers to different lights and colors may generally be the same, it is not definitely known that everyone sees the same color at any given time. If everyone sees the same differences, there should be neither a problem in matching a sample with a standard, nor should there be disagreement between individuals concerning dyestuffs necessary to match a given sample.

Many factors intervene which distort or otherwise upset man's ability to match colors. Among the problems involved are those of the age of the individual, his psychological outlook, the physical state of the individual, and the activity of the eye and brain. A designer of photo electric colorimeters stated that the human eye is much too good for designers to compete with at reasonable cost. The eye is provided with thermostatic equipment keeping it at constant temperature ± 1°C. The eye comes equipped with cleaning devices (the lids which clean off the surface). The cornea has correct spectral sensitivity. It comes supplied as standard equipment with no extra charge. The main problem is that it happens to be attached to an erractic computer—the brain. It is possible that the brain is at fault, but the make up of the eye and its response vary with individuals.

The eye consists of two essential elements. The focusing element contains the cornea, pupil, lens, and the vitreous humor. The color sensitive elements are the rods and cones. These rods and cones are the sites in and around the foveal pit collecting the energy and forwarding it to the brain. The rods are scattered about the periphery of the foveal pit and respond to very small amounts of light. These are the elements of the eye enabling the distinguishment between degrees of brightness. The rods are responsible for night vision in which the ability to discern between achromats is essential. Rods transmit light sensation to the brain via bundles of optic nerves and thus remove the sensation of color. On the other hand, more nearly centered in the foveal pit are the elements known as the cones. The cones require higher levels of illumination. As light collects on the cones, a message is transmitted to the brain which is reinterpreted as color. Figure 3 indicates the relative areas of maximum activity of both the rods and the cones. It is seen that maximum response to relative illumination is attained in the central portion of the visible spectrum. On the other hand, the rods respond at shorter wavelengths. The curve for the cones is similar to the luminosity curve of the standard observer.

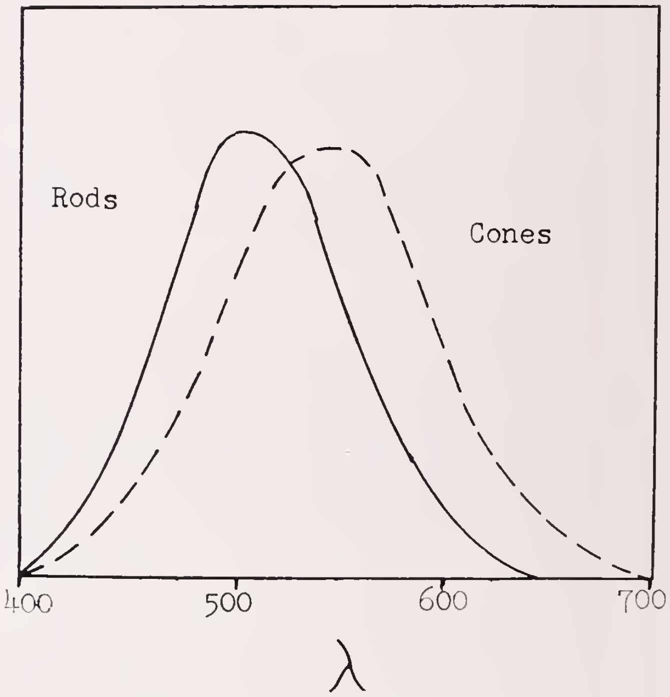

Figure 3.—Rod and Cone sensitivity.

When an object is viewed the relative amounts of absorption and/or reflection of light incident upon the object surface must be carefully weighed. Basically, without an object there can be no sensation of light. The sensation of light is achieved only when light has been deflected from its normal path. Light can be seen only as a contrast. Since light travels in a straight line, some portion of the light will be reflected or absorbed when it strikes an object. If the object is transparent, the light beam is refracted and thus changes occur in the optical parameters of the sample being viewed.

When a sample is viewed or compared with another sample, the background against which they are

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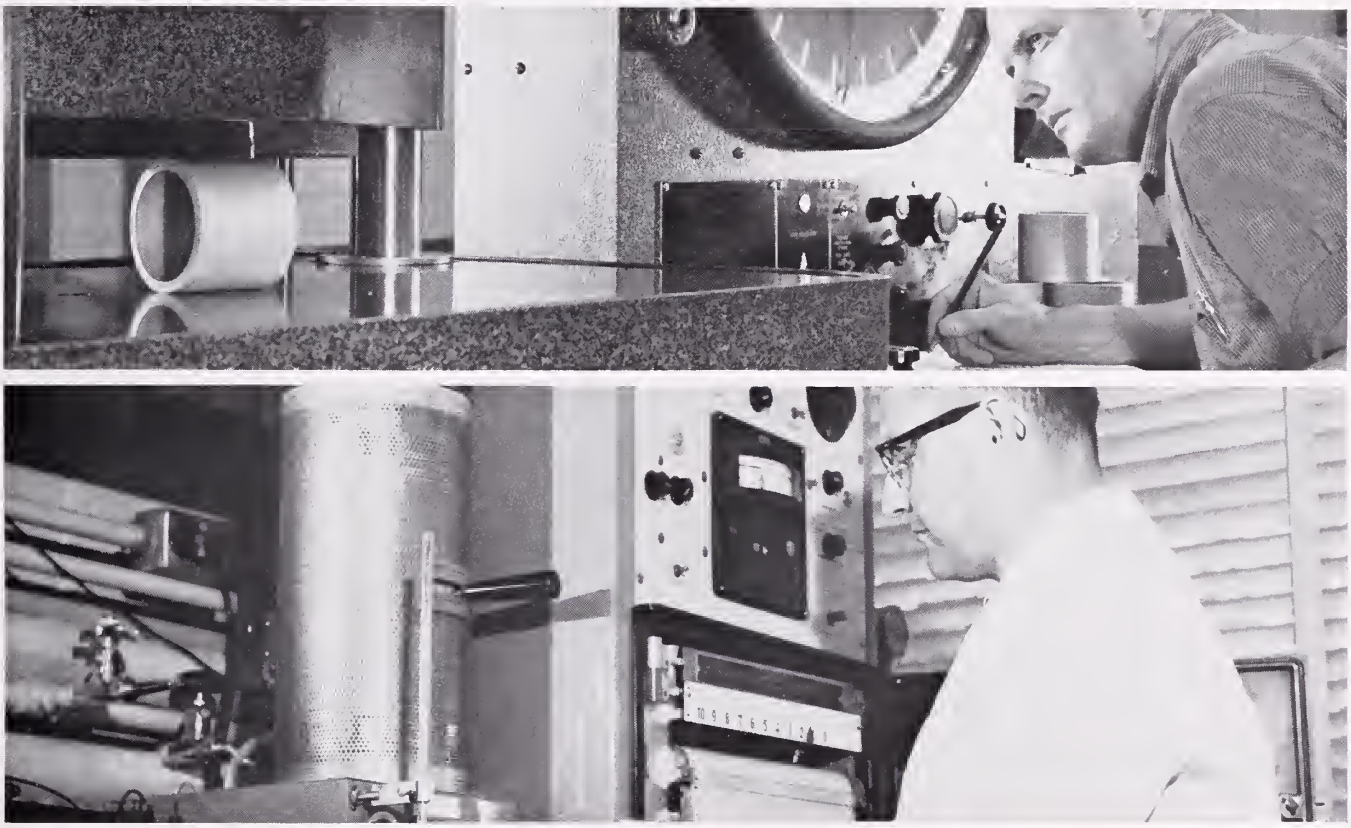

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viewed must be taken into consideration. The incident light is absorbed and reflected by the background. The background colorant absorbs lights and thus contributes to the samples viewed. This action may cause illusionary effects. A red color viewed against a blue background may appear yellowish. The same red viewed against a yellow background may appear bluish while an orange viewed against a blue background may appear brighter. A green viewed with a yellow background appears bluer. On the other hand, achromats tend to maintain more nearly uniform rendition of the color.

Lord Kelvin made the statement that a subject is not fully understood until it has been reduced to mathematical terms. The CIE Color System, commonly used for the interpretation of data, is an attempt to follow this concept. The derivation of the CIE Chromaticity Diagram is based upon colorimetry.

It should now be apparent that a given observer is capable of matching samples by mixing the three primary colors in selected combinations. However, instead of converting the squal energy spectrum into lumens per watt and then matching with the primaries on a lumen per lumen basis the matching might be applied directly to the energy of the of the equal energy spectrum. The results are expressed in terms of lumens of red, green, and blue required to match the unit energy at each wave band. The red, green, and blue primaries are directly related to the x, y, and z bar values of the tristimulus specification of the spectrum stimuli. Figure 4 is a graphic representation of the x, y, and z bar values necessary to match a given color at any given wavelength. However, since there is no color unless there is an illuminant, the values of the illuminant at any given wavelength must also be considered. A mathematical expression may therefore be derived involving the illuminant, the spectral reflectance of the sample, and the tristimulus specifications of the energy spectrum. The energy distribution of the illuminant is expressed in watts per wave band. The spectral reflectance of the sample is dimensionless while the tristimulus specifications of the equal energy spectrum are expressed as lumens of red, green, and blue per watt. The final dimensional analysis of the CIE method therefore becomes the product of these three factors, and the total reflected (or transmitted) red, green, and blue for all of the wave bands equals the tristimulus values for the samples or their equivalent stimuli in terms of the primary. The mechanics of the system are the products of the relative energy of the illuminant, the tristimulus specifications, and the transmittance or reflectance of the sample at selected wavelengths. If this system is followed wavelength by wavelength then the addition of the bar values of x, y, and z are product values yielding the X, Y, and Z values. These values are the total area under the curve. If these values are now plotted, a tridimensional graph must be used. However, by reducing these values to unity, a planar diagram can be utilized. The Chromaticity Coordinates of the CIE Chromaticity Diagram are found by the following equations:

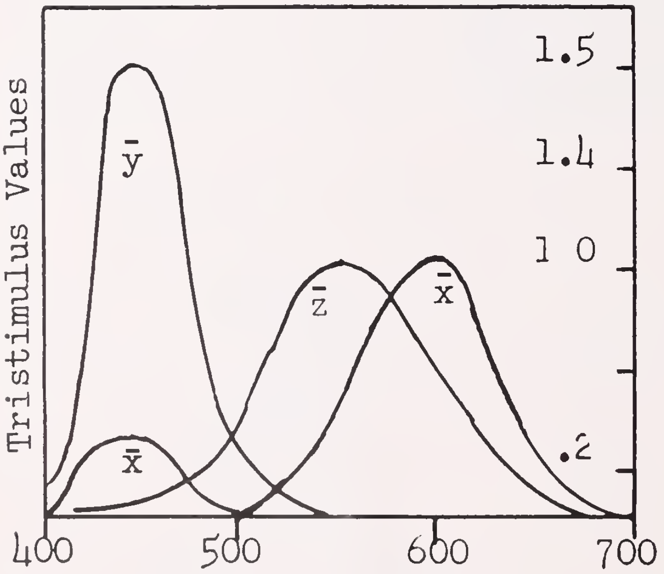

Figure 4.—Tristimulus values of the equal-energy spectrum.

$$x = \frac{X}{X + Y + Z}$$

$$y = \frac{Y}{X + Y + Z}$$

$$z = \frac{}{X + Y + Z}$$

It is seen that the values of x, y, and z should now total unity or 1.00. The precision of the CIE Method is usually adequate for the subtle distinction of color. However, the Chromaticity Coordinates by themselves do not provide complete information. A case in point is that white, grey, and black are of equal energy and should have the same coordinates ($x = 0.33$; $y = 0.33$). The difference here is one of reflectance and not of chomaticity. Therefore provision must be made for including these attributes.

As stated before, color description is a tridimensional affair consisting of hue, purity ,and lightness. In the CIE terms these attributes are designed respectively as dominant wavelength, excitation purity, and luminous reflectance. Each of these may now be specified in Figure 5.

Using the Chromaticity Diagram, it is theoretically possible that a straight line connecting any two

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points of specification producible by the additive combination of the terminal colors. Therefore, colors may be specified in terms of the Wavelength represented.

A straight line is drawn from the chomaticity point of the illuminant through the chromaticity coordinates so as to intersect the perimeter of the Chromaticity Diagram. The point of intersection is known as the dominant wavelength and is stated as such.

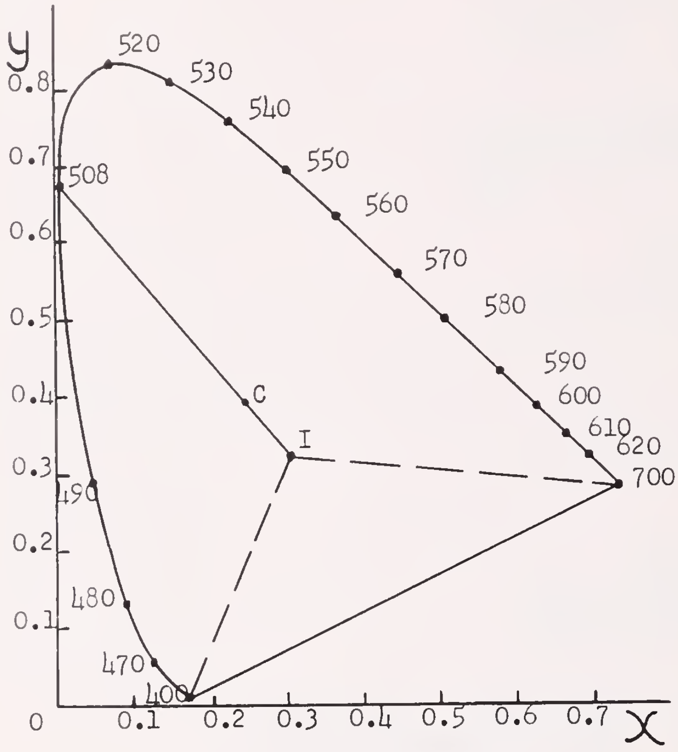

Figure 5.—Chromaticity Diagram

The ratio of the distance from the sample point to the distance from the spectrum locus to the illuminant point to the distance from the spectrum locus to the illuminant point is called the excitation purity. This represents the proportion of spectrum color of specified dominant wavelength in a mixture of spectrum color and illuminant color required to duplicate the same color. A pure color would have its coordinate points near the spectrum perimeter while a dull color should be located near the illuminant. The luminous reflection is the ratio of the Y tristimulus value for the sample to the value which Y would have if the reflectance were 100% for every wave band of the spectrum. The product of the energy of the illuminant and tristimulus specification of y at selected wavelengths is calculated. The sum total of these values equals the Y values for the tristimulus specifications of a given illuminant. This value is then divided into the Y value of the sample.

A further attribute of the chromaticity diagram is that purples are apparently not possible in this diagram. Purples are not present in the spectrum. However, purple is the complement of green. If straight lines were drawn from the locus of illumination to the 400-700 millicrons points of the Chromaticity Diagram, a triangle is formed. Within the confines of this triangle are located the purple and other blue red mixtures. In order to determine the dominant wavelength of a purple sample a straight line is drawn from the chromaticity coordinates of the sample through the locus of illumination. The line is then extended to the perimeter of the Chromaticity Diagram. A purple should pass through the green area of the diagram. In order to specify this color, a subscript c is used immediately following the dominant wavelength criteria. An illustration is that if the point of intersection were at 550 millicrons the dominant wavelength should be written as 550$_c$.

Analysis of the Chromaticity Diagram reveals the fact that equal changes in chromaticity coordinates are not directly relatable in color spacing throughout the entire Chromaticity Diagram. (Attempts to make these spacings more uniform have been made by transformation to the Munsell, Hunter, and MacAdams Systems.) For detailed treatment of the various transformations the book **Color In Business Science and Industry** authored by Deane B. Judd and Gunter Wyszecki is recommended. This book should be in the library of anyone concerned with color measurement.

Color measurement is a complex system of variables currently being used to advantage in the textile industry. Anyone approaching the subject of color measurement should analyze each spectral curve with regard to the sample measured so that a series of mental images may be formed over a period of time. The neophyte should approach color measurement with the knowledge and assurance that errors will be made. However, the object is to reduce or minimize these errors over a period of time so that definitive relationships are formed and may be used to advantage despite any system or instrument being used.

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There are opportunities at Leesona for graduates whose chief talents and interests are in the fields of textiles, physics, mathematics, metallurgy, ceramics, electronics and all engineering disciplines. Just write to Personnel Director, Leesona Corporation, Warwick, Rhode Island.

To help you decide—talk to Leesona!

TODAY'S TEXTILE INDUSTRY SHOW NEW PACE, DIRECTION and PHILOSOHPY

By William E. Reid

William E. Reid is President, Chief Executive Officer and Director of Riegel Textile Corporation; President and Director of Riegel Fiber Corporation; Director of Riegel Paper Corporation; and Director of International Products Corporation.

ALL OF US recognize the great heritage of the textile industry.

It was the industry which made the industrial revolution successful.

It was the industry which began the American factory system.

It is the industry which has met every challenge thrown to it in times of national crisis.

It is the industry which has borne the brunt of our concern for reshaping the world's industrial structure since the end of World War II.

It is the industry to which the emerging and developing nations of the world seem inclined to turn as their first, tentative step toward industrialization.

But the textile industry as it exists today is not the industry we knew a generation ago.

It is not the industry the emerging nations believe it to be.

Despite our best efforts to tell the true story of modern American textiles, it is not the industry so many of the American people think it is.

Fundamentally, the difference lies in a change of pace, a change of direction, a change of philosophy. It lies in a move toward mechanization and automation—the use of brains instead of brawn—a greater emphasis on the skillful use of capital rather than a massive use of labor.

From its earliest days, the textile industry has always been a machinery-conscious industry. But it was machinery-conscious with limitations. Hands had to be involved. There were mental and physical barriers to speed and efficiency.

For more than 150 years, this philosophy prevailed in the industry's higher echelons. It was reflected in the view that the expedient thing in capital spending was to limit expenditures to no more than depreciation allowances—woefully inadequate as they were in an inflationary economy. That meant little more than the maintenance and modernization of installed machinery and equipment, with a sprinkling of replacements. That philosophy has disappeared in the past few years.

SPENDING AT ALL-TIME HIGH

In 1963, the textile industry's capital spending hit an all-time peak of $640-million, an increase of 40 percent over 1950. In 1964, more than $760-million was invested in new plants and equipment, another record and 19 percent higher than the previous year. It is astounding to note our industry is spending 14 percent of its net worth on expansion—the highest percent of capital expenditure of any major industry in the United States.

This spending is a deliberate, calculated, positive step into the future. It is part of a movement that has brought us to a point where we have spent, including this year, more than five billion dollars for modernization and expansion since 1952.

The money is going for bricks and mortar, refrigeration and high-speed, high-efficiency machinery and equipment which will produce what **you** say your customers need and want. It is going for the development of a thoroughly modern capacity to meet an anticipated increased demand as the average of the nation's population drops in the next few years.

In short, the money is going into the development of the physical plant and frame of mind we would have thought impossible only a few years ago.

RESULTS HAVE BEEN DRAMATIC

In the years immediately prior to World War II, spindle speeds were 8,700 revolutions per minute. Today for the same yarn we get 13,500 revolutions. Drawing is three-and-a-half times faster, combing has increased 40 percent in production.

The preparation of yarn for weaving can be done three times faster, with greater quality control, than was possible only a few years ago.

Weaving speeds have been increased more than 100 percent with the shuttleless loom.

Color selection and control in the finishing processes can now be handled faster and with greater efficiency and accuracy by computers.

The net effect of these and other developments can be measured in many ways. One of the most effective is to consider that the number of processes necessary to produce print cloth has been reduced from 11 separate operations in 1920 to just six in 1964.

Even this is not enough, for the focus in technical development now is on the refinement of such things as a continuous automated spinning system which will lead to further consolidation of the number of production processes. In fact, the whole idea of process development is an exciting one among machinery manufacturers and textile production personnel.

PRICE TAG vs. PROFITS

In terms of cost, this revolution in the textile industry's technical structure carries a high price tag.

At the turn of the century, investment in a cotton cloth mill amounted to about $13 per spindle. That is: a 50,000 spindle mill would cost about $650,000.

Today, the same size mill would mean a total investment of about $295 per spindle, or a total of nearly $15 million.

Put another way, the investment per employee in a cloth mill in 1900 was about $1,300. This covered buildings, machinery, land and working capital. Compare this with Dan River's recent announcement of their new plant in Alabama. Mr. Erwin estimates an investment of about $10 million to create approximately 200 jobs—a cost of $50,000 per employee.

All of this is an impressive record of accomplishment for an industry which has, unfortunately, become accustomed to a net profit of about two cents out of each sales dollar. This fundamental limitation of capital makes modernization and expansion a strain more often than not, but we have no alternative for at least two reasons.

COMPETITION FORCES US TO CONTINUE

The first reason is the competitive element. I don't need to tell you about competition and how to sell textiles in the fact of it.

I think, however, that it would have raised the hackles on even the most hardened and realistic of you if you could have sat with us in Zurich, Switzerland at the annual meeting of the Committee of Management of the International Federation of Cotton and Allied Textile Industries. Practically the entire time was devoted to reviews of the structure of the textile industry in IFCATI's 21 member nations.

We listened to country after country, developing as well as industrialized, report the structural changes taking place: the age of their equipment, the rate of modernization, the degree of verticalization, the percentage of capacity being used, the change in skill requirements of employees, and the awesome capital necessary to move ahead.

A few of the countries present complained about the way in which the United States govenment was implementing the Geneva arrangements. You will all recall the purpose of the arrangements was to accomplish three things:

(A) Control soaring imports into certain countries that were bearing more than their share of the load;

(B) Open up closed or restricted markets in countries;

(C) Provide a means of an orderly expansion of trade by the developing countries to the developed countries—or, in other words, a participation in the growth of these markets.

No fair-minded person should criticize our administration of these arrangements as being too far restrictive. On the contrary, we can point out many instances where certain categories of imports have gotten completely out of control.

When we started down this arrangement route in the summer of 1961, imports were running at an annual rate of 813 million yards. In the first year of the long term arrangement they increased to 1,122 million—more than 309 million yards. And, of far more importance, our increase alone is greater than the total imports of many other developed countries. Not a single country has had their access to our market lessened. Everyone has the right to import more than they were doing. Many have been given increases through bilateral agreements, the latest example being the unjustified favorable treatment of Hong Kong when they were given increases in two critical categories; corduroy and duck.

Always remember—nothing in the long term arrangement guarantees any exporting country a share of an importing country's market. It has to be competitively earned.

The arrangement is in force and it opens our market to overseas manufacturers in any country which has a textile industry, and they fully intend to exploit these openings to the limit.

INDUSTRY HAS BECOME MARKET-ORIENTED

In addition to this competitive basis for our modernization and expansion, there is an additional reason for continuing our high rate of capital improvement. That is to acknowledge the shift within the textile industry from one of manufacturing orientation to one of market-orientation. We have at last begun to operate with our emphasis on the production of goods which will sell, as opposed to selling products whose only virtue is that they can be made efficiently.

Of course, efficiency continues to be a prime ingredient in ou rtotal effort. However, the fundamental truth remains that our goal is the satisfaction of demands for quality from our customers, from the consumers of textile products.

ATMI'S NEW TEXTILE MARKET DIVISION

Our experience with two-price cotton has provided us with some harsh lessons in the importance of orderly marketing. These lessons have served too, in focusing attention on the concept that the pressures we will continue to face make it mandatory that the textile industry develop itself increasingly as a market-oriented activity.

Selling yarn and cloh has never been a bed of roses. It is a world of few secrets, a multitude of companies making similar products, and quicksilver price points which have a habit of disappearing in the face of a competitor's lower offer.

But has there ever been a time when we were closer to market hysteria than as we waited for Congress to settle the cotton question?

There is nothing worse than ignorance. We didn't know what was going to happen and our only comfort lay in that we had plenty of company.

Fortunately, we had some cool heads operating in the market and we rode their knowledge through the

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crisis. We made the necessary price adjustments to accommodate shifting inventories, reluctant buyers, fluid price structures, and the prospects of a cotton cost reduction.

With the survival has come a precious knowledge of many things.

WHAT WE LEARNED

Primarily we learned that the textile market—like textile production—has been in a state of continuous evolution and that it is not the market we knew a generation ago.

We have learned something of inventory management. We have learned that no one can afford to carry massive inventories at current prices, and that pipelines must be shorter and freer-flowing.

We have learned something about balancing supply and demand, moving closer to the mainstream of American business in terms of business cycles and the effect of marketing on them. We are adapting to our marketing structures the latest developments in cost accounting, systems controls, electronics, and the more refined aspects of selling, including the base for effective advertising.

Underlying all of these is the seemingly simple knowledge that we are no longer a captive of a single fiber. We are, in fact, a multi-fiber industry with a wide range of fiber and product interests. We have a wider range of higher quality products to sell. We have a broader raw material base to choose from, and we are involved in a surge of technical development which is providing both the equipment and the knowledge to accommodate this new production concept.

These are radical changes in a structure which for so many years was little more than a glorious tradition. But their very nature creates for us the opportunity to make something of the textile industry that it has never been before.

WHERE WE STAND TODAY

The industry at the moment is a solid, sound, progressive industry which has its eye on tomorrow and the day after tomorrow. Because it is a healthy industry, it has the necessary capital to make needed improvements and the necessary resources to stimulate the discovery of new concepts. We have, in fact, no more problems than any other major industry in this country.

Our competition will not lessen. In terms of international trade, our competition will grow since the developing nations are demanding and they will get a better standard of living and a wider share of the world's trade. But, as the president of the International Federation of Cotton and Allied Textile Industries stated: "No permanent solution to a social or economic problem has ever been found by taking away from the rich and giving to the poor. It is much more complex than that."

The solution to the whole question of competition lies in the skillful use of resources to create a broader, more vigorous market place. It lies in better earnings, better representation in the securities market, a better return on investment and more skillful people throughout the system.

The number of production jobs in the textile industry has been reduced about a third in the past 17 years. The jobs which remain demand more skillful people and their rewards are commensurate with their ability.

Textile marketing has always been, it is now, and it probably will always be a rewarding occupation. But the rewards of the years ahead will go to those who move with the concepts—adapting, progressing, learning constantly.

OUR CHALLENGE OF TOMORROW

Within the framework of our industry, we take a great pride in our record as realists and we speak very freely of the opportunities which may lie before us. We can take advantage today of both these traits by facing squarely the biggest opportunity of them all, and that is: to move this whole industry of ours into the mainstream of our time.

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For 174 years the textile industry has been a major industry and a basic one. But for two many of those years, we have merely flirted with the potential greatness that lies within the industry's structure.

In the past decade-and-a-half, we have learned to stop tilting at windmills and to start smashing barriers. Since 1950, the technology of textile manufacturing has been an impressive period of accomplishment.

In the years that lie ahead, the progress will continue only as long as we learn to market what we have learned to manufacture. The opportunity will be fulfilled only as long as we justify the new concept of a market-oriented industry, the belief that it is here—with the orders and the sales—that the process both begins and ends.

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A-6301

Outstanding Seniors . . .

RICHARD ALLEN HILES

Richard Allen Hiles is a twenty-one year old Textile Chemistry major from Asheville, North Carolina. He has received honors since his sophomore year at Clemson.

To aid with his expenses at Clemson, Richard has received a Massengill-De Friece Foundation Scholarship, a South Carolina Manufacturer's Association Scholarship, and a Calloway Mills Company Scholarship.

While at Clemson, Richard has been a member of the American Association of Textile Chemists and Colorists and Phi Psi Fraternity.

Richard has gained valuable experience in the field of Textile Chemistry by working for American Enka Corporation in Enka, N. C.

After graduation he has an assistantship and plans to do graduate work in Biochemistry at Michigan State University.

EDGAR C. CROW

Edgar C. Crow, from West Palm Beach, Fla., is a twenty-two year old Industrial Management major. Ed has received a tennis scholarship while at Clemson.

On campus Ed has been on the Atlantic Coast Conference Honor Roll his sophomore, junior, and senior years. He received high honors his freshman and sophomore years and highest honors his junior and senior years. Ed has also been a member of Phi Eta Sigma, Phi Kappa Phi, the varsity tennis team, Pre-Law Society, Industrial Management Society, and the Society for Advancement of Management.

During vacations Ed worked for the West Palm Beach Recreation Department and has served as tennis instructor and program director at Camp Carolina in Brevard, North Carolina.

Ed plans to do graduate work in the School of Finance, University of Pennsylvania after graduation.

FRANK BUIST EAVES

Frank Buist Eaves, a twenty-two year old Textile Management major, is a native of Barnwell, South Carolina.

To aid in his expenses at Clemson, Buist has received an Allied Chemical Foundation Scholarship.

Buist is enrolled in Army ROTC and will receive his commission upon graduation. He is also a member of American Association of Textile Technology and Phi Psi.

He has gained valuable experience in the textile industry by working three summers at Barnwell Woolen Mill, a division of Deering, Milliken, Inc., located in Barnwell, South Carolina.

After graduation, Buist is planning to accept a position with Burlington Industries after two years duty in the Army.

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At Whitin, the doors are always open for new ideas and to new people. The success of any organization is directly proportional to its willingness to base its growth on the thinking of dynamic, creative, forward-looking people — people with the special knowledge and abilities to translate new ideas into practical plans and programs. Whitin has welcomed many. Each has made significant contributions to the improvement of Whitin products and services.

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Professional Development Courses

As of June 14, 145 applications were on hand. These were from many different industries, and represented 16 states and Canada. All indications are that the summer of 1965 will see, by far, the largest number of persons taking a Professional Development course of any one summer since the program began in 1958.

The courses are for individuals in industry. They are created, and revised, to comply with requests and suggestions from management of the various industries.

SCHEDULE OF COURSES, 1965

June 7 through 18:

P. D. 43—Basic Textile Chemistry

June 21 through 25:

P. D. 22—Introduction to Textile Manufacturing, Dyeing and Finishing.

June 21 through July 2:

P. D. 25—Yarn Manufacturing
P. D. 38—Supervisor Development
P. D. 41—Methods Analysis and Time Study
P. D. 44—Advanced Textile Chemistry

July 12 through 23:

P. D. 25—Yarn Manufacturing (a repeat)
P. D. 41—Methods and Time Study (a repeat)
P. D. 47—Quality Control
P. D. 56—Weaving: Fabric Design and Development
P. D. 79—Graduate Seminar in Industrial Administration

Plans are already in the making for the 1966 Professional Development program. Anyone wishing to be placed on the mailing list for professional development catalogs, and other information, should write Prof. C. V. Wray, Coordinator, Sirrine Hall, Clemson University, Clemson, S. C. 29631.

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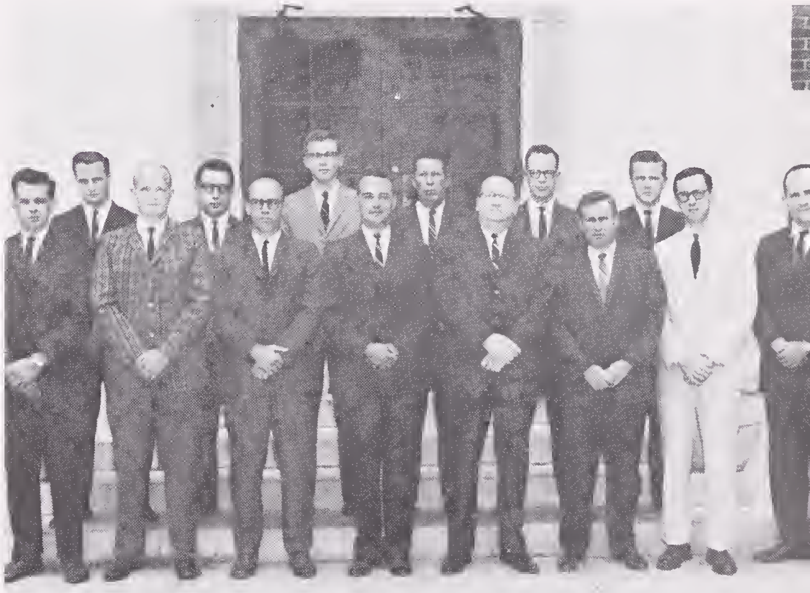

This picture shows one student from each state represented in Professional Development enrollment, of 90 persons, June 21-July 2, 1965.

Front Row (left to right): 1. Ronald F. Berry, Bibb Mfg. Co., Forsyth Div., Forsyth, Ga.; 2. Elmer C. Clark, Standard Knitting Mills, Knoxville, Tenn.; 3 Jack L. Grose, Perfect Circle Corp., Hagestown, Ind.; 4. J. Stoney Drake, 3rd, Drake Corp., Norfolk, Va.; 5. Charles V. Wray, Coordinator, Courses for Professional Development, Clemson University, Clemson S. C.; 6. Jesse J. Coyle, Archer Daniels Midland Co., Minneapolis, Minn.; 7. Cornelius J. Allen, I.B.M. Corporation, New York, N. Y.; 8. Stanley J. Dumovich, Franklin Chemical Co., Columbus, Ohio.

Back Row (left to right): Darren D. Parrish, Bemis Bag Co., Visinet Mill, St. Louis, Mo.; 2. Peter A Morretti, Products Developments Laboratory, Cranston, R. I.; 3. Edward L. Martin, Jr., Cliffside Division, Cone Mills Corp., Cliffside, N. C.; 4. John T. Lofton, Southern Regional Laboratory, U.S.D.A.—ARS, New Orleans, La.; 5. L. Robert Strong, Diamond Crystal Salt Co., St. Clair, Mich.; 6. James H. Isbell, Woodside Mills, Haynesworth Plant, Anderson, S. C.

Industrial Management Undergraduate Research Abstracts

Rigid Polyvinyl Chloride, A Thermoplastic

Pearce W. Hammond

This report consists of four main sections. Section One consists of an introduction which concerns itself with the characteristics of Rigid Polyvinyl Chloride. In Section Two the present applications of this thermoplastic are discussed showing the various fields in which it has found present employment. The Third Section deals with fields in which Rigid Polyvinyl Chloride shows great promise for the future. The last section embodies the conclusion in which Rigid Polyvinyl Chloride is compared with the entire plastic field, revealing the fact that Rigid Polyvinyl Chloride is rapidly growing both in applications and usage and, indeed, is a desirable and worthwhile material.

An Analysis of Radio Advertising in Retail Selling

Ralph F. King, Jr. and David P. George, Jr.

This study was undertaken to determine the patterns and practices followed by retailers in employing radio as a medium of advertising. In order to determine these practices, a standardized list of questions was asked selected retailers in Greenville, South Carolina.

The findings of this survey were then compared with theoretical practices which were obtained from texts on the subject. Having done this, the medium of radio was compared with its largest competition—newspaper.

From the findings of the survey and the study of its related areas, it was concluded that there are certain practices which are necessary for effective radio advertising. Although radio is not as effective as other media, it was found that it could be used profitably.

Synopsis of Milliken Tetra Pak, a Division of Deering Milliken

Stephen K. Long and George E. Davis

From observations of operations at Milliken Tetra Pak in Spartanburg, South Carolina, we gained most of our material for the report. Additional information was obtained from dairy companies and pamphlets on the subject.

The purpose of this report is to point out the effect that Milliken Tetra Pak will have on the packaging industry. Our purpose is achieved by describing the structure and operations of Milliken Tetra Pak. The value of Tetra Pak, uses, advantages and disadvantages, and future, add more proof that Tetra Pak will probably be the greatest invention in the packaging industry since the tin can. And since Milliken Tetra Pak has complete rights to the machines in this country, they should profit immensely.

An Analysis of the Structure and Operation of the Contract Department of Jantzen Southern, Inc., Seneca, S. C. as it Interrelates to Receiving, Inspection and Packaging

Paul J. Wessinger and Ray W. Crenshaw

The purpose of this paper is to examine the Contract Department of Jantzen Southern, Inc., and to outline its procedures and relationships to the Receiving, Inspection and Packaging Departments. This research was not entered into with the intention of making deductions or improvements, but rather to determine and explain the operations of the Contract Department as it exists today.

The primary source of information for all data was a series of personal interviews with Contract Department Management. Further information was obtained through personal observation of the Jantzen facilities at Seneca, South Carolina, and examination of company manuals, information sheets and forms.

A chronological order was utilized in composing the material, and some assumptions and restrictions were made. The discussion was limited to knitwear because Jantzen's other lines are handled in a very similar fashion. We assumed the contracting of a new Jantzen manufacturer since the recontracting of a present manufacturer would be a greatly simplified version of the same procedure. Approximations were also made where any confidential figures were encountered.

While analyzing the activities of the Contract Department, several interesting facts were noted. Jantzen is somewhat unique in requiring a written contract of all manufacturers who produce garments for it. Secondly, Jantzen does not manufacture all of the garments which it markets. There are three main reasons for this: 1. Through the utilization of other manufacturers, Jantzen can obtain a greater volume of production and a more diversified line than could otherwise be produced; 2. Quality is higher when garments are produced on specialized machines by specialists; and 3. There is a great cost and capital investment savings recognized through the utilization of contracting.

The Growth of the Ceramics Industry in South Carolina

Frank C. Falls

This paper is intended to bring to light the growth of an industry in South Carolina which has a bright future, not only in South Carolina, but the entire United States—the ceramics industry. This paper begins with a brief history of the industry and continues to give information relating to the raw materials of the industry, the feasibility of a ceramics plant locating in South Carolina, and the growth of the industry in South Carolina over the past ten years.

The portion of the paper on the raw materials of the ceramics industry was taken for the most part from the library books. The information on the industrial resources of South Carolina came from correspondence with state governmental agencies and ceramics plants located throughout the state.

An Analysis of Aviation in Industry in the Southeast

William O. Martin and John M. Quarles

This is a study of the use of Aviation in Private Industry. It covers all phases of aviation with primary emphasis placed upon the use of private aircraft. The information was obtained in the most part from a questionnaire sent to 197 firms in the Southeastern United States, from personal interviews, and from data furnished by various segments of the Transportation Industry in the form of timetables and rate charts. The information obtained was both statistically and qualitatively interpreted. The results were as follows: (1) Aviation in some form is used by over 99% of the firms contacted; (2) The use of company-owned planes is not widespread but is growing; (3) The main advantage of using private planes is the speed they have, and the main disadvantage in using them is the high cost of acquiring and maintaining them.

A Statistical Profile of Sewing Machines Operators in Garment Plants

Walter C. Ronemous

Industry of today is placing greater emphasis on increasing the efficiency of its workers through various means. One such method is the screening of applicants for employment. In this method applicants with the greatest amount of potential are selected to fill vacancies.

This paper is concerned with a study of the employees of four local garment plants in order to arrive at a stereotype description of an ideal sewing machine operator.

Though this study is not conclusive, it does bring to light many of the things which are related to a worker's efficiency and the degree of his efficiency.

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1889 – 1965

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A Survey of Dormitory Student Parking

Donald R. James and Kenneth F. Stovall

The purpose of this report was to present facts and data concerning the dormitory student with a car on campus. This report contains the G.P.R. of dormitory students owning cars, the type of car they own, and the present and proposed solution for solving the parking problem of dormitory students.

Information was obtained from the Traffic Office, Office of Student Affairs, the Campus Police Department, and a questionnaire distributed to students owning cars.

Based on information and data collected and evaluated, it was found that the parking problem is increasing as enrollment of students increases. To meet the demand for more parking space, it is necessary that permanent parking lots be constructed immediately and major proposals contained in this report adopted.

Analysis of Economic Growth of Anderson, S. C. 1940-1965

R. J. Carter, W. M. Lineburger and T. E. Martin

This paper is a study of the locational development of Anderson, S. C., in order to determine if von Thunen's classical theory of plant location is applicable to the economic development of that city.

Our decision is based on information obtained from the following sources: The city directory, the telephone directory, material from City Hall and the Chamber of Commerce, personal interviews, and a survey of Anderson enterprises.

From the information compiled, and from maps drawn from this information, we were able to conclude that von Thunen's theory does apply very well to Anderson. Although von Thunen's theory was originally established for an agricultural area, we found only slight discrepancies in applying it to Anderson.

The Operations of the Anderson County Airport, Anderson, S. C.

Jerry P. Brown

This paper discusses the Anderson County Airport from its beginning to the present date. The history of the airport has been shown, and the present operations of the airport discussed. The major portion of the paper deals with the operations of Carolina Aero Service, Incorporated; Southern Airways, Incorporated; and the Flight Service Station at Anderson. All of the information in this paper was obtained from persons employed at the airport through interviews or materials supplied by them.

RADAR — IN A NEW SETTING

Radar in a textile mill or a home laundry?

Not only posible but probable, according to engineering researchers at Georgia Tech, if certain discoveries can be made regarding the moisture-drawing ability of microwaves. The scientists already know that cotton and man-made fibers will dry faster when exposed to microwaves of radio wave length than when exposed to ordinary household radiant heat. Radar wave lengths are even shorter than radio wave lengths, but no one has ever been able to utilize them for bulk drying of textiles and textile products because no one knows exactly why microwaves withdraw moisture.

Textile manufacturers have utilized microwaves of radio frequency for several years to dry man-made fiber materials such as rayon. The cost is several times that of radiant heat, thus reducing cost efficiency, but the system makes a spectacular reduction in the amount of drying time required.

Radiant heat drying is slow because temperatures must be kept very low to prevent scorching. The use of microwaves eliminates much of the heat problem and the Georgia Tech scientists think that they can eventually build ovens which will utilize radar waves to cut the drying time for spools of yarn from several hours to as little as ten minutes.

For some of the initial experiments, the researchers are using a small microwave oven that is being produced commercially and sold to restaurants for reheating pre-cooked foods.

TURNING A CORNER

Much is being made these days of the revival of interest in the textile industry among the nation's professional money managers.

For many years, these people turned their noses up at the mere mention of textiles. In more recent times, however, they have shown an increasing willingness to accept the fundamental truth that there is no industry more modern, dynamic and progressive than textiles.

In the language of Wall Street, the textile industry has "turned the corner."

The textile industry has turned the corner because it never lost faith in itself. It has been beset by imports, two-price cotton, changing times and a host of other worries — but the firm foundation provided by almost a million loyal, hard-working people has kept the industry from sinking when few others shared its faith in the future.

"Turning the corner" in the eyes of the professional money managers is a major accomplishment. More than that, it is the proof of an industry's ability to fight and win against seemingly overwhelming odds.

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One shuttle looks and feels like most any other shuttle of the same type. Almost makes you think one's just as good as another.

How come then, that Fletcher, the booming, fast-growing youngster of the industry is already one of the "Big 3"? (Only third, mind you, but up there and moving right along.)

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WHY RESEARCH?

Attention to research and development programs within the textile industry has received its greatest emphasis within the past few years. In the last eight years alone, the National Science Foundation says that textile companies, combined with the apparel industry, have increased their research and development spending from $13-million to more than $35-million annually.

Parallel with the striking increase in money allocated to research, the combined textile-apparel industry has almost doubled the number of full-time research and development scientists and engineers since 1957.

Thus, the trend is an upward one. In fact, more than half of all the industrial expenditures for research and development in the United States since 1776 has been made since the end of the Korean War.

For most of us, research sometimes seems so remote and far-fetched that we overlook much of what it means to us in practical, everyday terms.

Research keeps manufacturing products and processes up to date and competitive. It plants the seed for future growth, and it creates new jobs while it creates new products. There is no better illustration of these three points than the growing textile machinery company which said recently that about three-fourths of all its products didn't even exist in 1956. The company is completely dependent upon a modern and dynamic textile industry for its sales.

The white-coated men and women who work in the company labs may seem emorte and withdawn from the everyday problems of the production line. But they, and what they are doing, may very well be the best insurance policy the company has.

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Student Publication
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Clemson University
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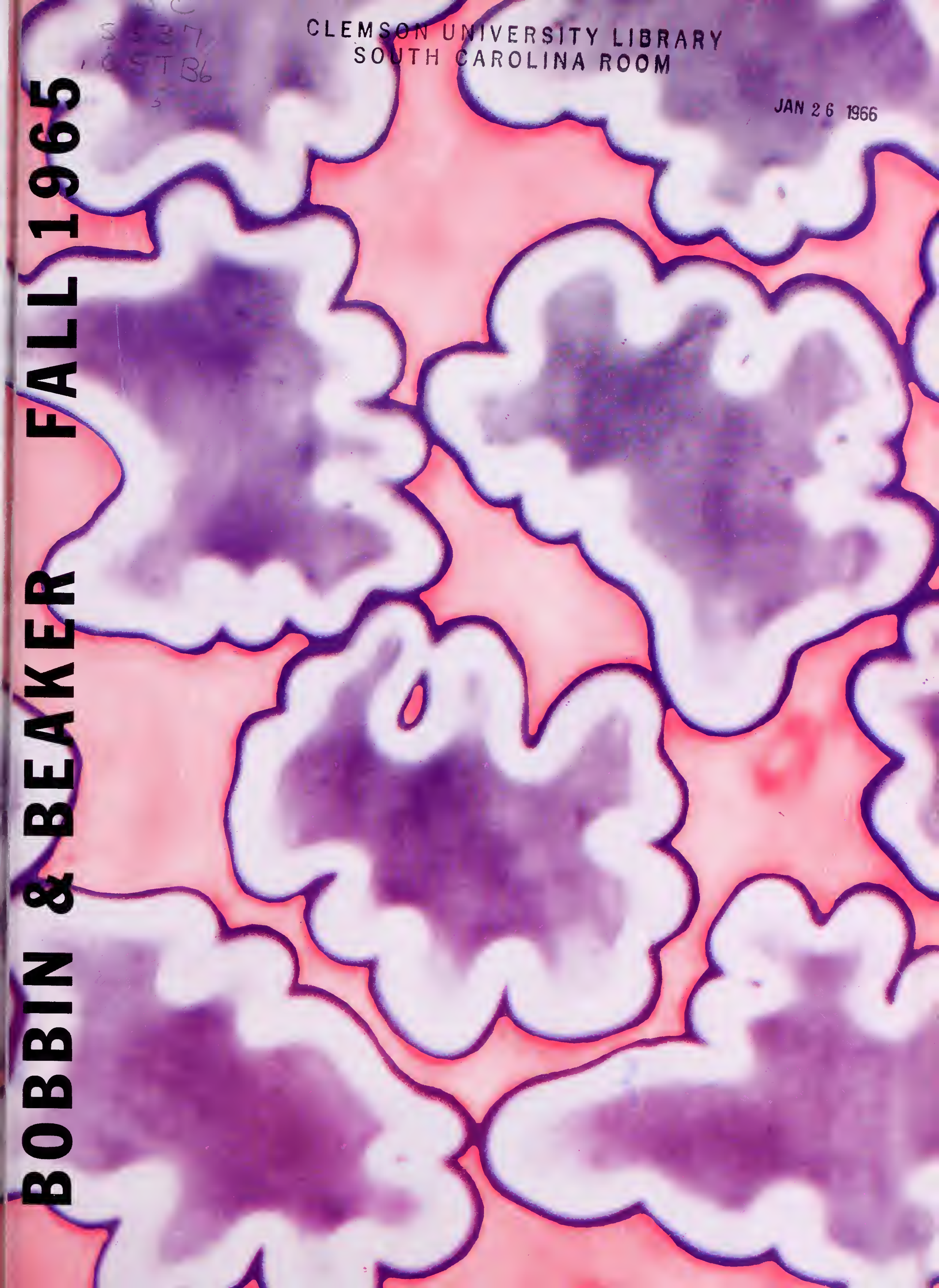

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C

Corobex (Kôr ′a-bex)

A durable anti-bacterial additive for textiles. Provides fixed, lasting protection against germs, mildew, perspiration odors and other odors of bacterial origin.

Easily applied during dyeing or finishing operations. Will cause no shade change in dyed and printed colors, no yellowing of whites. Does not affect the hand of the finished goods. Compatible with most types of finishing materials.

D

Discolite[1] **(dĭs′kō·līte)**

Concentrated sodium sulphoxylate formaldehyde available in lump, pea, rice or powder form.

A powerful reducing agent, stable at high temperatures. Widely used to effect reduction and solution of vat colors, and for discharge effects when applied to colored grounds. Effective when mixed with vat colors and discharge pastes wherever the reducing agent must retain its reducing power after being dried into the fabric.

Dispersall (dĭs·pûr′sal)

A long chain ethylene oxide condensate in the form of a colorless, neutral, somewhat viscous liquid. Fully resistant to hard water, and miscible with water in all proportions. A retardant and leveling assistant in vat dyeing.

Used widely as a dispersing agent in dyeing synthetic fibers with disperse colors and for fast color salts and bases in Napthol dyeing and printing.

Effective in stripping to prevent redeposition of the color on stripped goods.

N

Neofinish (Ne/.O.Finish)

Non-Ionic softener dispersible in hot water, suitable for all textile fibres, both natural and synthetic. Compatible with all types of finishing materials, including resin finishes. No development of color or odor in goods finished with Neofinish, even in storage. No yellowing at time of application.

Neowet (nē′ō·wĕt)

Complex Polyethelene Ether in the form of a pale yellow, slightly viscous liquid.

A non-ionic surface active wetting agent, effective at all temperatures. Completely compatible with enzymatic desizing agents and readily soluble in water. Contains 33⅓% active ingredients. Widely used in scouring all types of textile fabrics and for general wetting purposes.

Neowet X (nē′ō·wĕt)

Organic Ether Sulphonate in the form of a water white slightly viscous liquid.

An anionic surface active wetting agent, effective at all temperatures. Does not affect enzyme activity in desizing. Compatible with hydrogen peroxide and resin finishes. High detergent value. Contains 20% active ingredients.

Neozymes[1] **(nē′ō·zīms)**

Desizing agents made up of amylolytic, proteolytic and fat splitting enzymes available in the form of crystalline powder or liquid concentrate for high or low temperature requirements.

Neozymes quickly remove all trace of starch glue or gelatin sizing without danger of damage to even the most delicate fabrics. For best results, use with NEOWET to speed saturation.

P

Parolite[1] **(păr′ō·līte)**

Zinc sulphoxylate formaldehyde in the form of white crystalline powder. A highly concentrated stripping agent for all forms of wool and modern synthetics.

Completely soluble in water. Leaves stripped goods soft, completely free of zinc dust and in most receptive condition for further processing. Often completely strips goods where other stripping agents fail. Very effective in discharge printing on acetate rayon.

V

Vatrolite[1] **(văt′rō·līte)**

Concentrated sodium hydrosulphite in the form of white crystalline powder. A powerful reducing agent for vat colors, ideal for dry feeding because of its free flowing, dustless character. Completely soluble in water.

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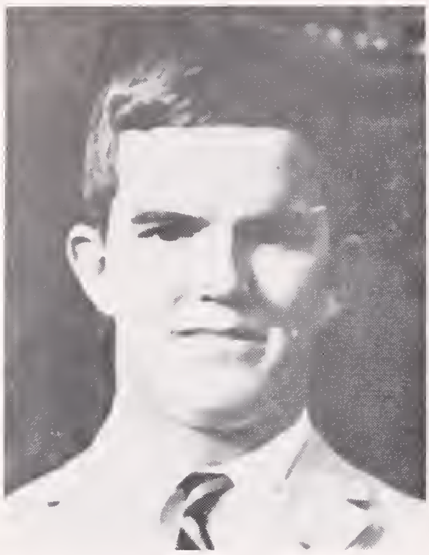

from the Editor

In this, the first issue of the year, we have received permission from the S. C. Textile Manufacturer's Association to reprint two articles from their last meeting in Spartanburg. Our grateful thanks go out to them. Also included is a report on the 1965 Professional Development Program and several undergraduate research abstracts.

We feel we must say that there will be only one more Bobbin and Beaker. All advertisers please note this. We greatly appreciate your support over the past years.

A Merry Christmas and happy rewarding New Year to All!

—S. E. G.

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ONE INDUSTRY - MANY FIBERS

An Address By

J. C. Cowan, Jr.
Burlington Industries, Inc.

South Carolina Textile Manufacturers' Association
News Seminar
Spartanburg, S. C., October 4, 1965

It is a genuine pleasure for me to talk with you today. We in textiles recognize the need for exchange of information between industry and the press. The future of our company and others represented here today depends upon public understanding — not only of our role in the economy, but of the atmosphere in which we do business, the forces to which our industry is exposed and the techniques we follow in keeping ahead in this age of rapid change.

We recognize your role as guardian of public information, and we are largely dependent upon you and your various media for the image which we of the textile industry project.

Fiber complexity in the textile industry is a fascinating subject — one which holds much of the secret of the industry's current prosperity and which certainly will affect its future.

We pick up the thread of the textile industry back in the very earliest years of history. One wit has said that textiles came into style when the fig leaf went out. It's pretty nearly appropriate, for textiles is an extremely old industry. Records trace the weaving of cloth back well over 3,000 years before Christ to the Nile Valley of Egypt. Fragments of ancient cotton bolls and woven fabric found in a Mexican cave are estimated to date back to about 5,800 B. C.

Through most of its early history, textiles was a home industry. There was very little complexity to fibers in those early days. People used what the land provided — cotton, flax, wool, jute, mohair, and silk. These fibers were the raw materials for some of the earliest, and incidentally some of the most beautiful fabrics known to man.

They were woven first by hand and later by crude instruments. A paradox about the textile industry is that the basic principle of weaving remains about the same as it was then. The vast difference today is in the speed and flexibility of modern machinery, the variety and combinations of fibers, and the methods of finishing fabrics.

The textile industry triggered the American Industrial Revolution. Samuel Slater's textile mill, completed in Pawtucket, Rhode Island, in 1793, was the beginning of the factory system of manufacture in this country. Eli Whitney's Cotton gin of 1794 elevated Southern states to the forefront of cotton producing areas of the world, and gave tremendous impetus to the cotton textile industry in the Southeast and along the Atlantic Seaboard.

These inventions, important as theye were, become very pale indeed in the light of more recent advances in the industry. More change has occurred in textiles during the past 25 years than in all prior history. We could describe this as the beginning of the era of multi-fibers, the break from dependence upon natural fibers and the emergence of man-made fibers which today cover the entire spectrum.

Production of man-made fibers, with all of its modern embellishments, actually simulates the manufacturing of silk threads by the lowly silk worm, that is, the extrusion of a liquid substance through spinerettes to form a tiny strand which solidifies.

History tells us that the silk thread was discovered quite by accident. In the year 2640 B. C. a Chinese empress is said to have dropped a silkworm cocoon into a pail of hot water. When she picked it up she noticed that the threads unraveled from around the cocoon. So an industry was born.

The natural phenomenon of the silkworm fascinated scientists, whose continuing efforts have produced myriad filaments with diverse properties and uses.

Basically, production of man-made fibers falls into three categories: The **solvent** method in which a polymer solution in a solvent is forced through tiny holes into warm air. The solvent evaporates and leaves the liquid filament to solidify.

The second technique is the **wet** method — where a polymer solution passes through tiny holes into another solution where it coagulates.

The third is the **melt** method, where a solid polymer is melted and forced through tiny holes into air where it cools and solidifies.

I'll not burden you with a scientific explanation of the term "polymer." Suffice it to say that a polymer is merely a union of simple molecules into giant molecules and the lining up of these molecules into a chain-like effect to form a filament.

Making them line up properly poses problems much like those of the drill sergeant with a platoon of raw recruits who don't know left from right. Scientific refinements of the simple spinning principle have solved the problem, however, and the man-made fibers produced today have molecules well in line to form some of the most durable filaments ever devised by man or nature.

Problems beyond the mere extrusion of the initial filaments include those of drawing the fiber to give it strength; putting certain additives in the polymer to give it the desired luster, sunlight resistance or heat stability; crimping it if it is to be cut into staple; adding finish so that it will handle well in mill processing; and even developing special dyestuffs and techniques so that it can be dyed in a full range of colors.

Burlington Industries actually cut its teeth on one of the first man-made fibers — rayon. This fiber, made of chemically treated cellulose from wood pulp or cotton linters, is generally considered a European invention of the 19th century. It sorigin goes back to earlier days, to tapa cloth of the Marquesas Islands, where natives produced fiber from a gummy substance found in the bark of mulberry trees.

As early as 1664, Dr. Robert Hooke of England predicted the coming of this "artificial silk." In 1886 a commercial process for its production was exhibited at the Paris Exhibition.

In 1910 the first successful plant for the manufacture of rayon by the viscose process was opened at Marcus Hook, Pa., and two years later rayon hosiery was first marketed successfully. The first rayon knitted outerwear appeared in 1916.

Kenneth Lord, Sr., one of the founders of what is today Burlington Industries' Galey & Lord division, coined the term "rayon" in 1924.

In 1925 Spencer Love converted a small cotton mill to rayon fabric production. Burlington's first plant to produce rayon dress goods was constructed in 1927.

Through quality control and close scrutiny of production techniques, Burlington weathered the so-called "rayon depression" and emerged as one of the leaders in the use of the new yarn.

Dr. W. H. Carruthers of DuPont made another giant step in development of man-made fibers in 1930 when he produced the first nylon, now the leading true synthetic fiber, whose tremendous strength and versatility makes it desirable for such diversified and demanding uses as safety belt webbing, sheer stockings, protective body armor and intimate lingerie.

* * * * *

The complexity of any industry is determined by two things — the number of raw materials used in the final product and the number of operations necessary to reach the final product stage.

The textile industry in recent years has risen high up the range of complexity. At the top, of course, is the chemical industry which has something like 92 different raw materials and an infinite number of processes.

Chemicals have contributed a great deal to the progress of textiles, and the two industries have moved ahead in one of the most impressive alliances of productive effort in the history of American industry.

South Carolina, with its heavy concentration of textile and synthetic yarn plants, illustrates how the two have grown up together, all for the betterment of the state.

The latest index of man-made fibers of the world lists more than 2,000 different fibers by trademark. The majority of these fibers can readily be distinguished by chemical or physical means.

During World War II there were only a very few nylon descriptions available; today DuPont alone offers more than 1,100 distinct nylon products broken down into, at latest count, 47 different types.

It is impossible to estimate with any certainty how many raw materials we use in the textile industry, even if we were to exclude dyestuffs and finishing compounds, which are in a world of complexity all their own.

At the present time we at Burlington use eight natural fibers — cotton, wool, silk, jute, flax, mohair, alpaca and rubber — and more than 30 man-made fibers. I'll not try to enumerate them. Blends of natural and man-made fibers are almost limitless in number.

While development of this wide variety of man-made fibers has been a challenge to the scientist, practical use of them in various combinations has fallen the lot of the textile industry itself.

In effect, the complexity presents an opportunity of variety, and a challenge of selectivity. Someone, somewhere in the production set-up must pick the right fiber for the right job. He must decide whether Avrill, Lirelle, Nupron, Xena, Zantrell or Zantress

700 is to be used in a particular fabric construction. And you can project this selection maze on and on. Is it any wonder that we and other textile companies place a growing dependence upon chemists and quality engineers in our business?

The selection is not always left to us. Sometimes a customer influenced by past experiences, consumer acceptance or the amount of promotion given a particular fiber, will call the shots and specify a certain fiber in a certain fabric. However, most of the burden of selectivity is left with the textile industry. The industry has worked the bugs out of many new fibers and through tests has found the most practical, and most marketable place for them.

The public has been the beneficiary, through a wider selection of fabrics, engineered for specific end uses to provide greater wear value, versatility and economy.

* * * * * *

There was a move back at the turn of the 20th century to do away with the U. S. Patent Office — on the theory that everything worth inventing had already been invented.

We would be just as foolish to think that we have reached the ultimate in development of fibers. When we think we have all the answers, when we think we've made all the progress conceivable, some enterprising young scientist discovers an altogether new textile raw material or technique — and we're off and running again.

This is as it should be, because change and challenge are the mark of the successful industry.

Two of the very latest developments in textiles appear to be most promising: stretch fabric and durable press, one involving the use of new fibers or specialized mechanical or chemical processes, and the other involving new fabric finishes coupled with newly developed garment pressing or oven treatment techniques.

It now appears that the next step in our continuing efforts to give the consumer what he wants will be to combine the features of stretch and durable press into the same fabric. This deelopment is in the works.

Glass fiber as a base material for textile fabric is a relatively new development. Glass neither rots, mildews, burns or deteriorates under exposure to sunlight.

Wash and wear is a household term today, but it is a concept introduced only 15 years ago.

These properties have given us an almost unlimited and highly sophisticated variety of fabrics for apparels, home furnishings and industrial markets.

* * * * *

Have we reached a saturation point in fiber diversity? I think not. Latest estimates made at a seminar on fibers by the American Management Association indicate that by 1975 the market will require 10 billion pounds of man-made fibers a year, an increase from 7.9 billion pounds this year.

Clemson only recently announced development of a new variety of cotton whose qualities could mean greater use of native cotton by textile manufacturers.

Promotion by manufacturers will continue, with improved production skills and greater volume likely leading to lower material costs. Research and development will uncover new fiber modifications, new methods and special properties permitting further adoption of man-mades for greater variety in end uses.

Nylon manufacturers believe that textile nylon use will double by 1975, about half of that to be used in apparels such as textured outerwear tricot, circular knit textured dress goods, outerwear fabrics and broadwoven stretch fabrics. A 29 per cent increase in nylon hosiery is expected over the same period. Nylon yarn for carpets will increase about 55 per cent.

We can assume that similar, if less dramatic, growth will be shared by other man-made fibers which perform well for the buying public. New ones will surely appear by 1975.

So, what we term complexity of fibers in the textile industry today is likely to be viewed in retrospect as just another era of experimentation and development several years hence. We view the 1930's in the same light today.

This is the pattern of progress, however, and we must gear our operation to keep pace. Viewing the industry long range, I can see the greater fiber complexity, or diversity if you choose, will continue to be a major factor in the growth of textiles. We have met the challenge in the past, and I believe we are better equipped to meet the challenge of the future, however great it might be.

Complex as the industry might be, we still depend upon simple things — public understanding among them. Many of you will say that this is a relatively new point of view for the industry, and I suppose you are right. We **do** value your interest, however, and your desire to better understand our industry which plays such a vital role in the economy of South Carolina.

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THIS TRIANGLE, a mark of distinction, guarantees dyed and bleached yarns with superior knitting and weaving qualities. Wherever you see THIS TRIANGLE, you can be sure that quality fabrics are being produced.

Substantial investments in modernization and expansion projects in recent years have resulted in increased sales of yarns produced at this plant.

The continued growth of Piedmont is ample proof that modernization is imperative in today's competitive markets.

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Fancourt Seminar

Record attendance and a varied and instructive program characterized the Fourth Annual Walter F. Fancourt Memorial Seminar held in Greensboro on October 28-29.

Some 55 faculty members and students from 13 Carolina colleges and universities plus leading figures in the textile industry attended the two-day session this year, during which they visited two modern textile plants, learned of new textile developments in military clothing and equipment, and participated in a job opportunities discussion.

Founded in 1962 by John L. Fancourt in memory of his father and older brother, the Seminar annually brings together a group of college students to learn about the potentials of a textile career from top-flight industry representatives.

Principal speaker at the Seminar banquet was Erwin O. Kruegel, Special Assistant for Research and Development Liaison, Defense Supply Agency.

Suggesting to his audience that there were six criteria by which to assess an industry in terms of a future career, Kruegel gave high marks to the textile industry in all—progress record, dynamic quality, career opportunities, geographical location, starting salaries, and contributions to national defense. He pointed out that there were excellent openings available for young people in both private industry and government positions conneced with textiles.

Kruegel said that improved clothing and other textile products have added greatly to the efficiency of the American fighting men in Viet Nam, and, by reducing superfluous weight, enable him to function more effectively than his counter-parts of either World War II or Korea.

Among the articles that Kruegel used to illustrate his talk were new combat boots with the soles vulcanized directly to the uppers and a nylon mesh insert for ventilation. The shoes come equipped with a stainless steel insole in order to protect against sharpened bamboo stakes that the Viet Cong uses as booby traps.

A new light-weight rucksack was also shown. Weighing several pounds less than previous equipment, the pack carier is also designed for instant removal in case of attack so that the soldier will not lose valuable time or be hampered by his equipment during an ambush.

Kruegel also showed a nylon helmet that, used with the conventional steel helmet has reduced head injuries by 50%, a jungle hammock, an armored vest for protection against fragmentation weapons, and a light-weight, non absorbant blanket.

Visitors from Clemson University to the Fourth Annual Walter F. Fancourt Memorial Seminar in Greensboro, N. C., watch the preparation of container for shipping chemicals from the W. F. Fancourt Co. Left to right are: Professor D. P. Thomson, Will T. Brown, Jr., Covington, Ga.; Bruce R. Edwards, Tryon, N. C.; John C. Willis, Clemson, S. C., and James R. Jensen, Alexandria, Va. The Fancourt Co. sponsors the two-day event each year for the benefit of college students who may be interested in a career in textiles.

On Thursday afternoon and Friday morning, the Seminar visited the Elm Street Plant, Carter Division, of J. P. Stevens Co. in Greensboro, and the J. Spencer Love Hosiery Center of Burlington Industries in Burlington.

The final session of the Seminar on Friday afternoon was devoted to a Job Opportunities Panel at which industry spokesmen outlined their opinions on future of young people in textiles and answered specified questions from the floor.

Participating in the panel were Maurice Fishman, vice president and technical director, Guilford Mills, Inc.; Clifton H. Karnes, director of Central Research and Development Laboratories of Burlington Industries, Inc.; Odis E. Little, manager, Industrial Relations, Synthetics Division, J. P. Stevens & Co., Inc.; and Thomas H. Ward, Jr., manager, Recruitment and Employment, Cone Mills Corporation.

Some 55 students and faculty members attended the Seminar, representing 13 colleges: Belmont Abbey, Catawba, Clemson, Davidson, Duke, Elon, Guilford, High Point, North Carolina State, University of North Carolina at Chapel Hill, University of North Carolina at Greensboro, University of South Carolina, and Wake Forest.

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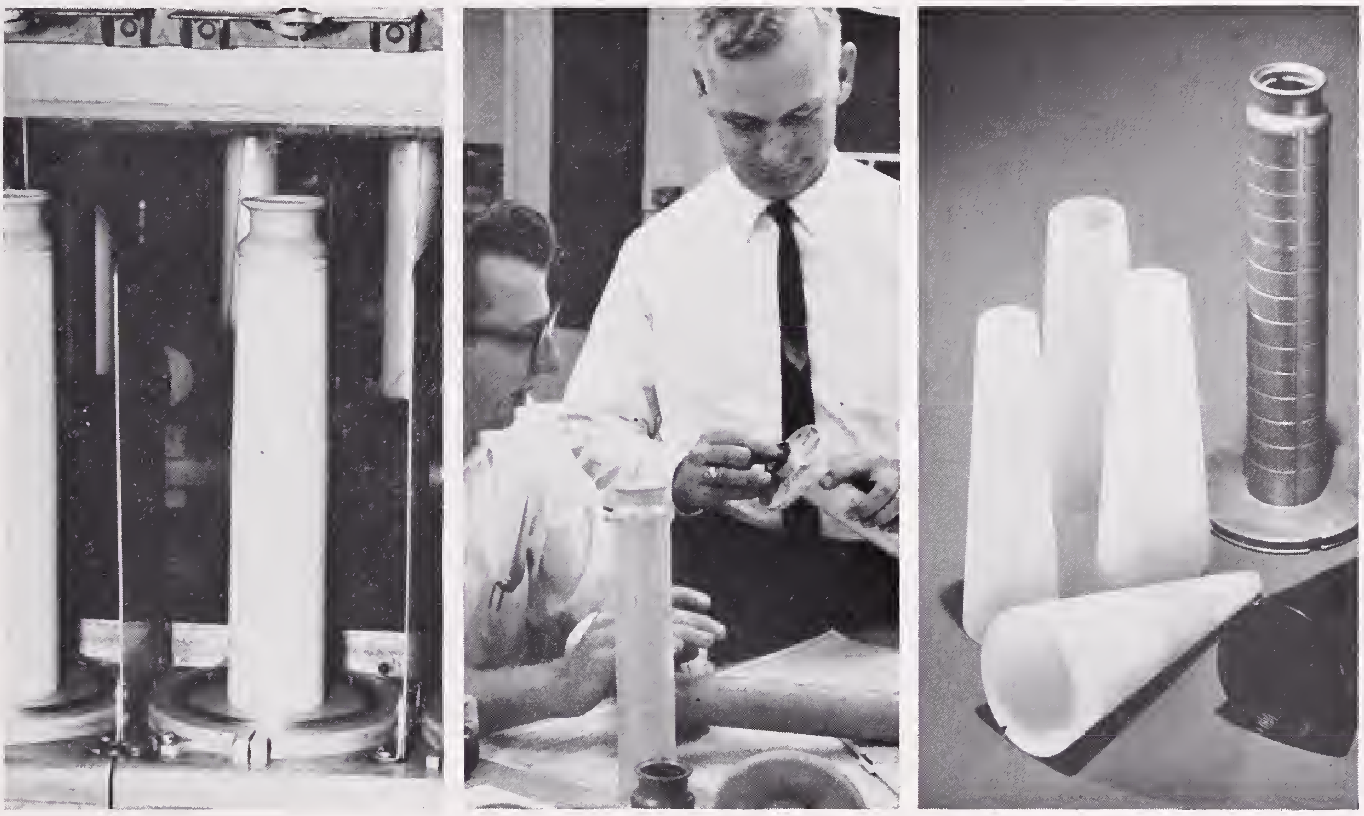

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5148

TEXTILES IN THE MARKET PLACE

TEXTILE NEWS SEMINAR

Sponsored By
The Public Relations Division
of the
South Carolina
Textile Manufacturers Association
in cooperation with the
American Textile Manufacturers Institute
October 4th and 5th, 1965

It is a real pleasure for me to accept the responsibility of addressing the newsmen serving South Carolina, and to be on the program with such a distinguished group, whom you have already heard, and will hear in the course of this seminar. I consider each and every one of them good business men in the textile industry, and I am sure that each of you from the news media have or will receive from them the best information available today, relating to the textile industry.

The subject, Textiles in the Market Place, is so broad and complex that I want each of you to know at the outset that I do not pretend to be an expert, nor will I be able to cover for you every aspect. The market place for textile was known to most of us in the industry to be located in the Worth Street section of New York City in our early days, but we now find it has moved both in geographic locations and in growth and change. It would probably be well to review some of the early developments in the marketing of textiles, and our thoughts will leave out some of the major areas of textiles, such as yarns, etc, and think, in the main, about piece goods.

The textile industry, from the earliest times, has consisted of great numbers of widely scattered plants of various productions. Early mills sought distribution by consigning goods to storekeepers in various New England commercial centers. They acted as selling agents for mills then pioneering the technique of mass production, the inadequacies of this service, in which no certainty of volume markets, or certain payment of accounts accrued to the mill, were quickly apparent.

The next big step in distribution was use of wholesale commission merchants in the big Philadelphia, Baltimore and New York centers, which with the opening of Western trade, were providing surer outlets for substantial amounts of factory made goods. This was an improvement, but the relationship suffered as recurring manufacturing surpluses left these dealers with only periodic public auctions as a means of sale, a method of dubious value for the manufacturers.

The mill selling house, which devoted its full time to the needs of its textile mill clients, developed during the War of 1812 as the truly effective answer to sales problems of the industry, and has continued so with few modifications to the present. The selling houses pioneered mass marketing skills suited to the skills of mass factory production in the mills. They brought stability to existing mills and provided the base for further industrial expansion. Their position and value in textiles have been recognized as almost unique in American industry, and remain so for various mills. A great part of the plants on woven fabrics, and in other areas of industry, now spread from Maine to Texas.

Over the years, brokerage firms have come into being, and they have performed a specific purpose for the industry through the years.

In addition to the selling house and the brokerage firm, we find more and more mills entering into what I refer to as direct selling. At this point, it would probably be of interest to discuss the function of the three types of selling referred to above, and we find these functions being performed on a National and worldwide basis. The great majority of them operate from New York City. The prime task of the selling house is the sale of the products of mills they represent, through New York, through branches of the selling house, and other centers, and frequently, today, through foreign branches or export divisions. Thus the products of hundreds of plants at distant points are effectively and competively distributed to thousands of customers throughout this nation and the world.

No less important than the actual sale, however, is the likewise historic task of advising the mills. The textile industry makes countless constructions and fabrics, and countless finishes for a vast list of end uses. Fashion affects apparel and household lines.

New technical developments affect industrial fabrics. There is a constantly growing list of new fabrics with new properties and values. No period prior to the last two decades has been more explosive in technical development and complexity of the market mix of fibre, fabric and finish. It is at the market level, in a ferment of ideas between customers and selling houses, that a great part of this development takes place.

It is a duty of the selling house, therefore, to keep the mill posted on all matters affecting its products and market opportunities. Knowing the range of a mills equipment, it must advise the fabrics or constructions which it feels will be most wanted in the future. It may advise on whether they should be sold in the loom state, or to contract for finishing and selling in the finished state. It may council on shifts from one fibre to another, or to blends. This calls too for such advice as the seller can give on the probabilities of supply, demand and price in the general market. Thus the sales organizations serve as professional business advisers and market counselors to the mills they represent.

The services previously cited are those provided generally by the selling house for the mills it represents, subject to the requirements of its product. The relationship of selling houses and mills, however, differ. There are substantional numbers of selling houses owned by, or owning their own mills, and selling for such plants alone. There are also a substantial number of selling houses, which while they are owned by their own mills, for which they sell also, provide the same marketing services on a commission basis to independent mills. A good number of independent plants are family-owned concerns,

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and the high and costly load of developing market facilities from the ground up is staggering, therefore, selling houses and brokerage firms play an important part in the textile market place, if the independent mills are to be able to obtain a well rounded selling service. Areas of independence with the selling house is usually stated by contract. The house in nearly all cases, is given the exclusive sales agency for the mill. Commission rates are stated; a low rate on greige goods, slightly higher on finished goods, and the highest rates usually on ready-for-the consumer products.

The mill retains complete control of prices, production, patterns of distribution, and hours of operation. Usually, no sale to a customer is binding until accepted by the mill. The contract with the selling house usually has a mutual cancellation clause, and a dissatisfied mill is free to transfer its account elsewhere on proper notice. Some independents have been sold through their present selling house, or its antecedents, for many years.

Brokerage firms perform services for the mills in a somewhat more limited area than the selling houses, and their major function is that of an agent, only.

Direct selling, of course, requires all of the aptitudes available, previously stated, plus greater market research, to keep the customer well informed and properly supplied, while generating a profit for the company.

All three of the types of selling I have mentioned operate in one or more of the various areas of griege sales, finishing services sales, finished goods sales, and end use sales. End use sales being those items such as domestics, hosiery, underwear, etc. The customers would be converters, cutters and retail outlets.

You have witnessed, during your visit, some of the most modern facilities in the industry today, indicating how far the industry has advanced in the technological improvevents, and no doubt continuing improvements in the technological field will be made in rapid strides in the immediate future. No longer can textile products be sold on the basis of art, and they will have to be sold on a basis which will combine the art with science. In my opinion, the selling methods have not improved as rapidly as the technical manufacturing methods, and there are a great many reasons for this.

The textile industry is, in fact, the conglomeration of diverse interest, that at times compete, and at times cooperate to the end of supplying the public on the most advantageous terms. It has large units and many medium and smaller size units. There is increased specialization. It is not uncommon for one textile company to buy from his competitor, sometimes due to this specialization, sometimes because of the firm having found markets beyond its ability to supply, sometimes for reasons of cost. Finishing plants frequently have capacity well beyond the means of owning mills, and they are selling finishing services to others. One plant may have a special greige production, which another requires for its special end use. One marketing staff may provide better results than others, or have special information or contacts in given fields. The best available facilities are best utilized in the textile market place. There are a few other items that may be of interest which would indicate some of the problems involved in selling products, that might help you in seeing its complexities.

1. Textile prices, profits and wage rates are consistently low when compared with other industries, ie. The four largest companies in the motor vehicle industry sells approximately 80.8% of the total dollar sales. The tobacco industry approximately 70.9%. In the petroleum industry, it is approximately 50.3%. In the rubber industry, approximately 48.1%, while in the textile industry, the four largest companies sales amount to approximately 22% of the total sales of the industry. In 1963 there were 4,435 plants with 20 or more employees, with sales being approximately 15,700,000,000 (fifteen billion, seven-hundred million). (Sales to date in 1965 indicate that on an annual rate, this year, sales should be approximately 16,500,000,000 (sixteen billion five-hundred million). Therefore, the average sales per plant in 1963 was

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approximately three million, five-hundred fifty thousand dollars. The United States Federal Trade Commission and the Security and Exchange Commission shows that in the 1956 thru 1964 period, the average net return on sales for the textile industry was approximately 5.2%, and the best year for the textile industry, in this period, was approximately 5.9% for the textile industry, while other manufacturing industries had a return of approximately 11.5%.

2. Some piece goods have sold recently for less than final World War II selling prices.

3. Per capita, consumption has been declining.

4. Looms and spindles have been dropping. (1964-65 figures not available)

5. The market is a battle field in new and old fibres.

6. Textiles have been recognized in the late President Kennedy's 1960 program as presenting unique problems in the U. S. economy.

From the above statements, you can readily see that the marketing and selling of textiles must be done on a more scientific basis in the future, if the industry is to take its rightful place in the furnishing of employment and proper profit return to the stockholder, as well as developing the proper image.

It is my opinion, the efforts that will be set forth in the immediate future, through marketing research, along with good sound business principle, we will see that textiles will be marketed in a manner that will make up seven prouder of our industry than we now are, and I hope that this presentation has given you a view that will allow you to help us create an image to the public that we are an essential industry and should be respected with all other industries.

Thank you.

WHAT THEY WANT

The real aim of any company's sales program is to market products that its customers want at a realistic and fair price.

One major American company believes so strongly in this that it has placed on the desk of each of its executives a little plaque inscribed, "Give them what they want." The company isn't interested in what the executives **think** the customers want; they're supposed to **know.**

Whether customers are buying automobiles or yarn, sailboats or shirts, boxcars or cloth, they all want quality — a product that will do a specific job and hold up in the process of doing it.

(Continued on page 16)

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New Products, New Problems And New Answers

The creative minds of textile scientists are constantly churning up ideas for new textile products — a situation which helps explain why American textiles are the world's best.

But for every new product these ideas cause, there is also a new problem and the need for a new answer.

For example, textile scientists are yet to find the limits of polyester fibers. They seem to work well in soft sweaters and rugged automobile tires. But when polyester fibers are first created and while they are being processed, a tremendous amount of static electricity is generated.

If the static is permitted to build high enough, polyester fibers will fly all over a room looking for a proper ground. The answer lies in a chemical pretreating process which eliminates all of the problem.

Nylon, the first of the "miracle" fibers, is perhaps best known and most popular in women's hosiery. But a nylon fiber thinner than than a human hair can wear through a stainless steel guide in a matter of days if it is not properly treated.

The reason for all of this, according to a textile scientists (Michel W. Avril of the Valchem Division of United Merchants and Manufacturers), is that when man-made fibers are first produced — by being squeezed through the tiny holes in a spinnerette — their molecules are disturbed. The molecules, the scientist says, are like wood chips on the surface of a pond. Individually, they are weak; together, they offer great strength.

The idea, then, is to pull them all together, in the same direction. This is done on high-speed machinery. The speed creates friction, the friction creates heat and the heat creates problems. So lubricants and chemical treatments for fibers — each precisely composed to do a specific job — have been created to eliminate the friction and heat problems without the speed.

Another instance in which the proper treatment of fibers has helped to create a better textile product is in certain types of carpet yarn. The yarn is made with a crimp, much like a lady's permanent. Too much friction could ruin the crimp, so a special treatment has been devised to permit the fiber to move at an even speed through machinery.

Even when the proper lubricants and chemical mixtures have been created, textile scientists are not necessarily without problems. In most instances, the treatments must be of a type which will not soak into yarns and which can be cleaned off the fibers when the pulling and moving is completed.

Thus, far, those problems have been solved, too.

Professional Development Program Establishes New Record

Courses for Professional Development were initiated in the School of Industrial Management and Textile Science, Clemson University, in the summer of 1958. Their purpose was, and is, to keep persons in industry abreast with advancement in science, technology, and management.

Some of the courses are for one week, but most cover a two-week period, and are offered only during the summer months. The courses are non-credit, however, a certificate is awarded upon satisfactory completion of a subject.

Most attending individuals stay in the University dorms, and have meals in the University dining room. Others commute, or stay at the Clemson House, the University hotel on campus.

Course content, and overall mechanics of the program, are constantly updated to give industry what it needs and has requested. During the years courses have been added, and plans are being made for additions in the 1966 summer program.

A large portion of the faculty for these courses is made up of faculty members of the School of Industrial Management and Textile Science. The remaining instructors are from other schools or colleges of the University.

To date, 638 individuals have completed a Professional Development course. Of this number, 146 attended during 1965 — a new record for any one summer's attendance.

The 146, a 67% increase over the previous summer, were from several types of industries, and represented 84 different position titles, 56 companies, and 91 industrial plants, located in 14 states and Canada.

A catalog, with application forms, will be placed in the mail in April. This will cover the Professional Development offerings for summer 1966. Anyone wishing a copy, or copies, should write Prof. C. V. Wray, Sirrine Hall, Clemson University, Clemson, South Carolina 29631.

WHAT THEY WANT

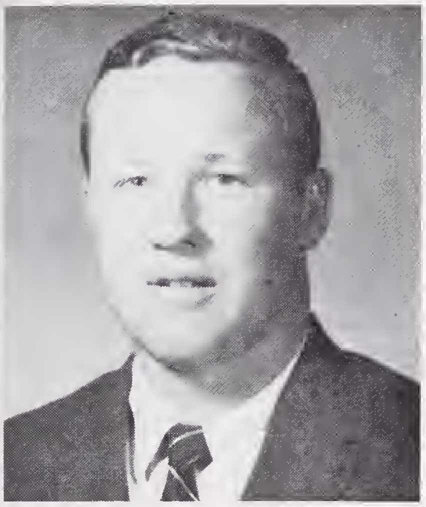
(Continued from page 15)

The textile industry has progressed for more than 170 years because of its ability to give its customers what they want. It has become a major industry because it is able to do more than barely satisfy man's need for shelter and clothing. It is a great industry because it knows the value of quality.

Every person in the industry, regardless of his job, has a hand in the preservation of that reputation.

Outstanding Seniors . . .

JOE WALDREP



Joe Waldrep is a twenty-two year old native of Roanoke, Alabama. He is majoring in Industrial Management and is a capable leader both on the football field and in the classroom.

Joe came to Clemson on a football scholarship and while here has participated in many phases of college life. He is a member of Phi Eta Sigma, Phi Kappa Phi, Blue Key, Tiger Brotherhood, Block "C" Club, Delta Kappa Alpha, The Industrial Management Society and the Society for Advancement of Management. He has played varsity football for three years, served as Junior Class President, and is now Chairman of Clemson's High Court. Just recently he received the honor of being listed with other select Clemson students in "Who's Who in American Colleges and Universities."

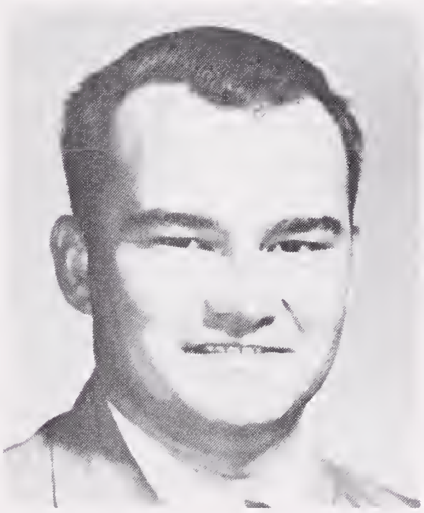
Joe has also found time to study and will graduate with a high grade point ratio. After graduation, he plans to attend law school or graduate business school but as yet he has not decided upon the institution.

JAMES ROBERT SMITH

James Robert Smith is a twenty-one year old Textile Management major from Laurens, South Carolina. He is married to the former Julia Pitts of Laurens.

To aid with his expenses at Clemson, James has received a Chemstrand Scholarship.

James is enrolled in Advanced Air Force ROTC and commands "V" Flight on the drill field. He is a member of the Arnold Air Society and Phi Psi Fraternity.



James has gained valuable experience in the textile industry by working three summers at Laurens Mills located in Laurens. He spent one of these summers working in the Industrial Engineering Department and the other two summers in the Knitting Department.

After graduation James plans to accept a commission in the Air Force in Category IN. After five years, he plans to take a position in the textile industry.

BRUCE R. EDWARDS

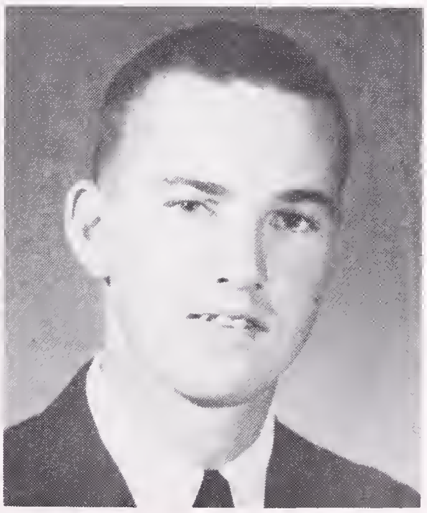
Bruce R. Edwards is a twenty-one year old Textile Chemistry major from Tryon, North Carolina.

To aid in his expenses at Clemson, Bruce has received a Leon-Lowenstein Foundation Scholarship for four years.

Bruce is a member of Phi Psi Fraternity and the American Association of Textile Chemists and Colorists. He has been on the Bobbin and Beaker Staff for two years and is currently serving his third year as a circulation manager.

Bruce has gained valuable experience in the field of Textile Chemistry by working in the lab of Pacific Mills, located in Lyman, South Carolina, for one summer and in the lab and dyehouse of Hatch Mill, located in Columbus, North Carolina, for two summers.

After graduation Bruce plans to do graduate work at the Institute of Textile Technology in Charlottesville, Virginia.



Mr. Smith Goes To Washington

Continued existence of the American cotton industry depends in large measure on continuation of a one-price cotton marketing system, a spokesman for the textile industry has told the Agriculture Committee of the U. S. House of Representatives.

J. Craig Smith of Sylacauga, Ala., a past president of the American Textile Manufacturers Institute, told the committee, "As the greatest consumer of American cotton, the American textile industry can speak with authority in saying that a permanent one-price system holds tremendous power to move the fiber through the mills to consumers.

"Textile mill management must make-long-range decisions regarding new mill construction, new product lines, research and promotion. These decisions are not going to be favorable to any fiber which is likely to be non-competitively priced. Therefore, I cannot over-emphasize the importance of a permanent one-price system for cotton."

Mr. Smith added, "The well-being of every person who looks toward the cotton industry for his livelihood, whether he is a cotton farmer or a cotton mill employee, is directly dependent upon the permanent continuation of a one-price cotton."

The House Agriculture Committee is presently considering a bill which would extend the one-price cotton program adopted in April 1964. The program provides that American mills must be able to purchase American cotton at the same price at which it is offered to foreign buyers.

Prior to adoption of the current program, foreign mills bought cotton under a two-price system that made American cotton up to $42.50 per bale cheaper for them than for American mills. The two-price system caused American mills to reduce their use of cotton and, also, resulted in greater imports of foreign textile products made with the cheaper cotton by low-wage labor.

Mr. Smith, who is president and treasurer of Avondale Mills and the only man ever to be president of both ATMI and the National Cotton Council, told the House Committee, "We have faith you will not let this great cotton industry be destroyed by a return to a two-price system."

He pointed out that since passage of the present program mill consumption of cotton has risen dramatically and should be more than 800,000 bales over last year. He also said that the industry has hired 29,000 more people than it had a year ago, that wages have been increased, expenditures for new plant and equipment are at record levels, and that loom operating hours have been at a record level during the past few months.

"There is absolutely no question but that the improvement was triggered by the law which enables American mills to buy American cotton at the same price it could be bought by foreign mills, "Mr Smith said. He added, "The textile industry is not advocating either a high price or a low price for cotton. But, a competitive price is mandatory if cotton is to share in the growing market for textile products."

The importance of removing uncertainty from the cotton marketing system is underlined, Mr. Smith said, by the textile industry's position as one of the most competitive industries in the United States.

"Prices of American textiles," he said, "always have been and today continue to be determined by supply and demand. Our customers create and develop demands or desires for products made from all fibers or blends of fibers or other materials. They are cost-conscious, and performance-conscious. They make the market.

"Long-range planning is a prime necessity all along the line . . . Long-range planning governs virtually all textile operations, and long-range planning is required for successful and efficient cotton farm operations. Long-range planning should dominate the government's cotton programs."

Mr. Smith appeared before the House Agriculture Committee as spokesman for ATMI, which is the textile industry's central trade association. As such, he represented textile companies and individuals throughout the United States.

Industrial Management Seminar Series In Tenth Year

Specialists in the fields of business, industry, and public service will lead the tenth annual Industrial Management Seminar Series during 1965-66. These men will address a group of some 250 of our industrial management students and faculty members.

The first seminar was conducted by Mr. D. F. Tucker, Atlanta, Georgia, and Mr. William Middleton, Greenville, South Carolina, both with S. S. Kresge Company. Their joint presentation related to "Revolutionary Trends in Retailing."

The second seminar will have Mr. R. Pat Jenkins, Greenville, South Carolina, as the speaker. Mr. Jenkins is design engineer for J. E. Sirrine Company, and

(Continued on page 21)

What are your plans after graduation?

When you cross from a life of preparing to one of performing, what kind of career should you choose? Are you thinking about research—academic or industrial? Or production, or sales, or management?

While you still have time to decide, why not have a talk with men who might offer new slants? These are men with a background of unusual accomplishment in textiles, chemistry, physics and other sciences—the men at Leesona.

Leesona Corporation is well known to every progressive textile man as the developer of the Unifil Loom Winder, the Uniconer Automatic Cone Winder, and other cost saving equipment that contribute much to improved textile production.

Leesona is known too, in other fields, for achievements that include:

Nuclear Batteries and Timing Devices, used in military and space systems.

Coil Winding Machinery, serving in control, communications, and automotive fields.

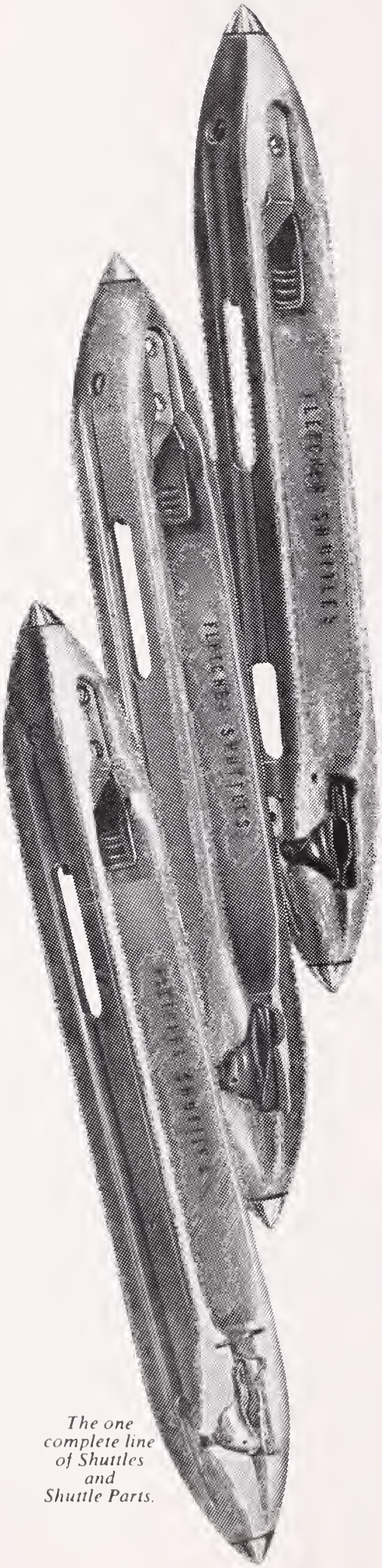
Research and Development, in such diverse areas as fuel cells . . . ICBM components . . . infra-red devices . . . electro-chemical power sources.

LEESONA

In expanding its activities in such areas, Leesona needs talent competent for scientific investigations. If you feel that the Leesona program may have potential for you in your own career, why not have a talk with a Leesona representative?

There are opportunities at Leesona for graduates whose chief talents and interests are in the fields of textiles, physics, mathematics, metallurgy, ceramics, electronics and all engineering disciplines. Just write to Personnel Director, Leesona Corporation, Warwick, Rhode Island.

To help you decide—talk to Leesona!



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At FLETCHER SHUTTLES We Learned A Lesson

(from Aesop, of all people!)

Remember the hare and the tortoise?

He didn't know it, but Aesop planted a message in that story. It's guided us here at Fletcher Shuttles during these growing years.

Tortoise-like, we've been plodding. Moving ahead, yes, not like the hare, perhaps. But then, you won't catch us napping.

There's no mad rush to turn out quantity. Just a persistent drive to produce the finest quality shuttle it's possible to make.

Making a good shuttle takes skill and time — lots of time. Time for curing, for bonding and for testing. (That's why we're safe in guaranteeing the quality and performance of every shuttle.)

And it takes time to provide customer service. And to work out customer problems.

With business constantly increasing we've often needed more output. Instead of overworking our facilities on a hustle-bustle production schedule, we added more plant space. Three times in the last five years.

In shuttles, Fletcher is only third in the "Big 3." And when you're not first, you'd better take time to be best.

Maybe we're hard-shelled about this. But that's the tortoise in us.

FLETCHER
Shuttles

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Undergraduate Research Abstracts

A Study of the Effectiveness of Radio Stations in Oconee County

Furman D. Rochester

The purpose of this paper was to determine the effectiveness of radio broadcasting in Oconee County. A sample survey of the population was taken to determine the opinions of the listening audience.

After interviewing the managers of the two radio stations in the county, a questionnaire was compiled. Five hundred people from all over the county were questioned about the station they listened to most, their opinions of the personnel, and from what they receive most of their information. The answers were analyzed according to age group.

The survey showed that two-thirds of the people listened to the local stations more than they did out-of-county stations. A great majority said they received more advertising, news, and general information from radio than any other source. It was also determined that the younger age groups preferred station WGOG of Walhalla and the older groups preferred WSNW of Seneca. Sixty percent said the personnel was as good or better than the personnel of other stations to which they listened.

In general it can be concluded that the Oconee County radio stations are very effective units of business. A large percentage of people in the county are pleased with the operations of the two stations and express pride in having them in the county.

The Paperboard Box Market in Florida, Featuring Potlatch Forests' Southeast Packaging Division in Jacksonville, Florida

Jack S. Kelly

This research paper is a study of the market, market area, paperboard products, paperboard production processes in Florida, and Potlatch Forests' participation in the industry as a whole. Charts and graphs showing the plant, the market area, and distribution of the market are used to give an overall picture of the market potential in and around the Jacksonville plant. The information was gathered by plant visits, personal interviews, and through correspondence with the Florida Development commission. The study points out the tremendous market potential for Potlatch Forests' production of paperboard boxes in and around Jacksonville, and the potential for continued expansion of the firm in the future as in the past. The study is a comprehensive one covering all aspects of the industry. The value of the compiled study could be great, depending upon the interests of the reader.

A Study of the Growth and an Analysis of the Products of the Pennsylvania Transformer Company

D. O. Hopf and W. E. Theus

This paper is a study of the history, products, and importance of the Pennsylvania Transformer Division of McGraw-Edison Electric Company. Emphasis was placed on new developments that have been put into effect and how these developments have helped the company to better serve its customers. The position of Pennsylvania Transformer Company in the public utility field was analyzed along with its importance to the community and the responsibilities it bears to the McGraw-Edison Company were investigated.

Our observations were achieved by personal visits to Canonsburg, Pennsylvania Plant and the Company's Southeastern Sales Office in Atlanta. Other information was obtained through personal interviews with plant management, personnel, and sales staff. For purposes of presentation, we divided this information into five parts dealing with: History of the Company, Pennsylvania Transformer's place in the Industry and Community, Power Transformer Production, Distribution Transformer production, and an analysis of the benefits of the new Extra High Voltage Test Center. As a result of our research, we concluded that the merger with McGraw-Edison was the most important step in the company's history and with its new advancements in testing and production, Pennsylvania Transformer Company will continue to be a leader in the highly competitive electrical products field.

INDUSTRIAL MANAGEMENT SEMINAR

(Continued from page 19)

will use as a subject, "Choosing an Industrial Plant Site."

Mr. Jenkins will be followed, later in the year, by Hon. Robert L. Stoddard, Mayor of Spartanburg, South Carolina. Mayor Stoddard has been asked to speak on "Municipal Operations and Industrial Relations."

During the spring semester, the speakers will be:

Mr. C. S. Reed, Vice President, Duke Power Company, Charlotte, North Carolina. His subject will be "Times Are Changing."

Mr. W. C. Cobb, Vice President, Keyes Fibre Company, New York City. Mr. Cobb's presentation will deal with market development.

Mr. W. E. Reid, President, Riegel Textile Corporation, New York City. Mr. Reid will cover a timely and appropriate phase of textiles.

The seminar program, since 1955, has introduced more than 6,000 Clemson University students to many outstanding leaders in business, industry, and other fields. The School of Industrial Management and Textile Science is deeply indebted to all of these gentlemen for sharing of their time and thinking with our students and faculty.

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* * * * *

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* * * * *

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* * * * *

More than 90 per cent of the chafer fabric in tubeless tires is made of man-made fibers.

* * * * *

Twenty-three nations are participants in a long-term arrangement which guides international trade in cotton textiles.

* * * * *

Textile mills in the Southeast account for 90 per cent of U. S. domestic cotton consumption.

* * * * *

American textile machinery manufacturers expect total sales of about 700-million in 1965.

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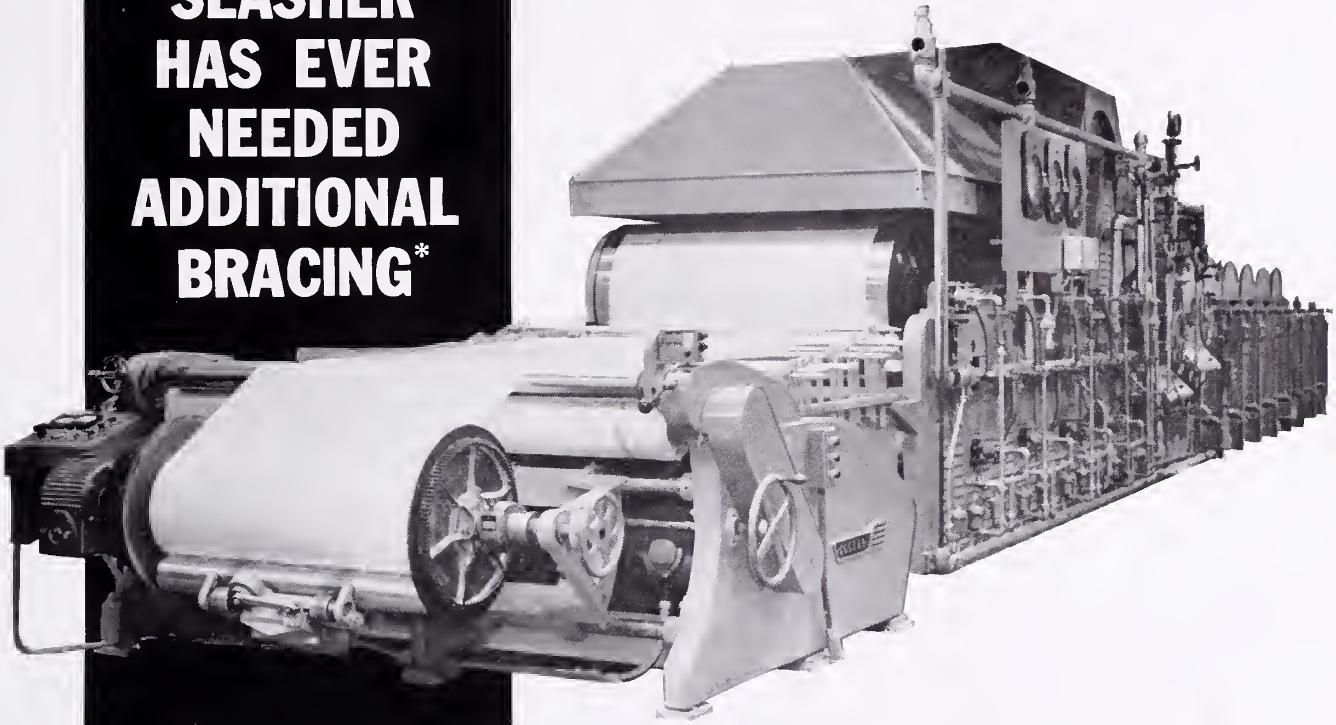

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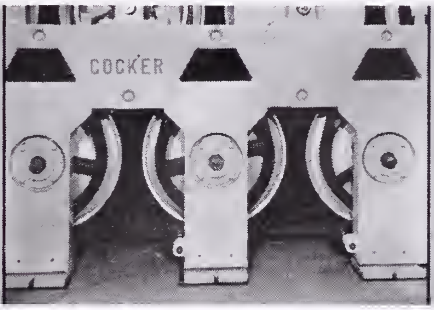

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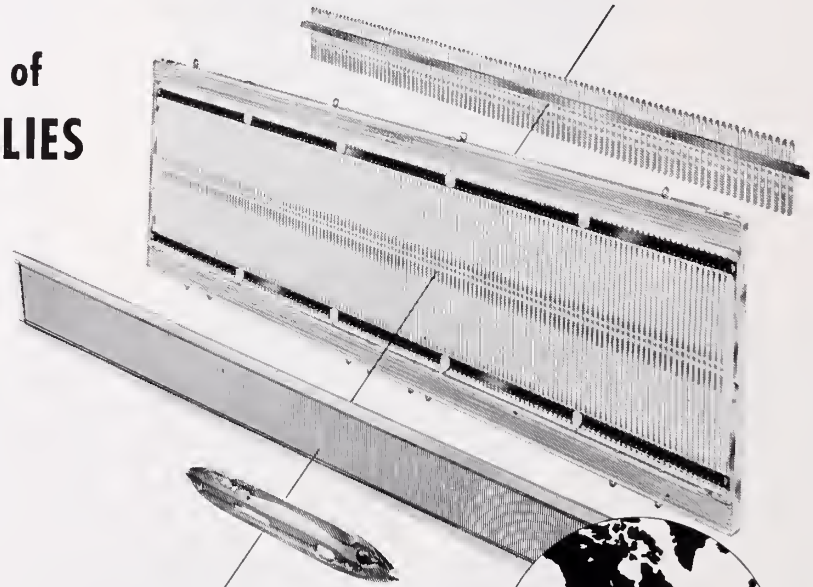

6

Please note that this is the last issue of the BOBBIN AND BEAKER. It is being discontinued.

Bobbin & Beaker

CLEMSON UNIVERSITY

Winter-Spring Issue 1966

Special
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D

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Concentrated sodium sulphoxylate formaldehyde available in lump, pea, rice or powder form.

A powerful reducing agent, stable at high temperatures. Widely used to effect reduction and solution of vat colors, and for discharge effects when applied to colored grounds. Effective when mixed with vat colors and discharge pastes wherever the reducing agent must retain its reducing power after being dried into the fabric.

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Effective in stripping to prevent redeposition of the color on stripped goods.

N

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P

Parolite® (păr′ ō · līte)

Zinc sulphoxylate formaldehyde in the form of white crystalline powder. A highly concentrated stripping agent for all forms of wool and modern synthetics.

Completely soluble in water. Leaves stripped goods soft, completely free of zinc dust and in most receptive condition for further processing. Often completely strips goods where other stripping agents fail. Very effective in discharge printing on acetate rayon.

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Bobbin & Beaker

Official Student Publication
Clemson School of Industrial Management and Textile Science

VOL. 23 WINTER-SPRING ISSUE 1966

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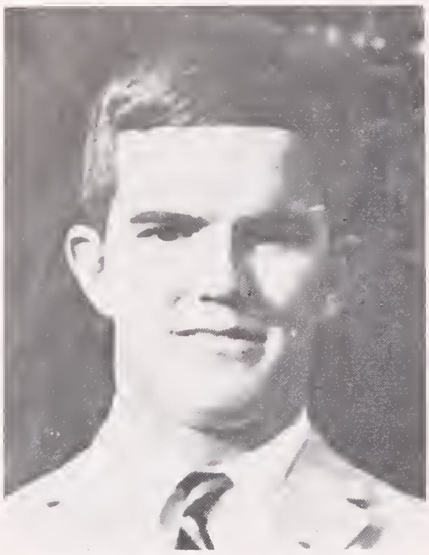

from the Editor

This is the last issue of the Bobbin and Beaker. There have been many who have made this publication possible: the advisors, advertisers, and others. We give all our sincere thanks.

A special thanks, however, must go to Mrs. Dorothy Houx, Sirrine Librarian, whose behind the scenes help has been most invaluable.

In the last issue is an article by H. W. Close and also articles of two retiring members of the textile faculty.

Again we would like to thank our loyal advertisers and hope that all readers will look upon them favorably.

On behalf of the Bobbin and Beaker staff, I wish you all success and happiness in any endeavors you might undertake.

—S. E. G.

Wes Connelly

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SONOCO leadership meets the challenge...

... economical, reusable plastic yarn carriers!

In its continuing quest for better and more economical yarn carriers, Sonoco has paced the industry in the development of plastic bobbins and cones.

Typical of these plastic products are bobbins for glass fiber and other synthetic yarns. They possess great strength, dimensional stability and are custom-formed and finished to close tolerance in various grades of thermoplastic. Like all carriers in this category, they are suitable for repeated use.

With its over 65 years' experience in yarn carriers, Sonoco is well qualified to assume leadership in exploring the application of plastics for this purpose. *Only Sonoco* has the necessary research and design facilities. For example, inexpensive product samples can be furnished for customer evaluation. Continuing research is being conducted in the area of plastic cones, with a variety of types currently undergoing tests in mills and in our laboratories.

The exhaustive research devoted to plastic carriers is typical of that which is part of *every* Sonoco product. For Sonoco customers it means economy and dependable performance. *Don't settle for less!*

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S148

The Queen's Shrinking Domain

A serious lack of price stability and the refinement of alternate fibers apparently combined last year to put a tighter squeeze on the shrinking domain of silk, queen of the textile industry's family.

Raw silk is available in commercial quantities from overseas only, and unsettled economic conditions during most of 1965 in the principal Far Eastern silk-producing nations had world-wide repercussions. Sharp price fluctuations throughout the year undermined both consumer and manufacturer confidence in raw silk because of the strong relationship between the textile industry's raw material costs and finished product prices.

One of the effects of the world silk situation is depicted by the 1965 record of raw silk's movement into the textile marketing mainstream. Deliveries to silk textile production plants in the United States dropped to 33,190 bales last year from the 1964 level of 36,547. Imports of raw silk took an even sharper tumble, from a 1964 total of 37,103 bales to only 30,458 bales in 1965.

By contrast, the United States imported 611,302 bales of raw silk in 1929. The price of it reached an average of $4.93 a pound and there wasn't enough to go around when orders for the year were added up. Nor were there any other fibers available to do the jobs silk could do.

In the years since that zenith of activity, silk has lost its position as a basic textile fiber and has its relative position in the total fibers market dwindle to insignificance, although it is still considered one of the most luxurious fibers in the world. It shrugged off the advent of rayon (called "artificial silk" by its early promoters) and acetate early in the 20th Century, but the combination of economic depression and stepped-up fiber research was too much for silk.

The big breakdown came during the depression of the 1930's. Ten years after 1929's record highs, the price of raw silk had dropped to $1.69 per pound and the market had more than enough to meet requests. Of greater significance, nylon had been introduced in 1938 and was rapidly mopping up many of silk's primary markets, especially women's hosiery.

The advent of World War II thwarted silk's immediate comeback hopes, and the aftermath of the war smoothed the way for nylon and other fibers to monopolize almost all of silk's traditional markets. Restoration of war-torn silk production facilities provided the industry with a new supply base of raw silk but the desperate struggle of the past 15 years to restore silk to its once prominent position has resulted largely in an unstable raw silk market rather than in notably expanded consumer product markets.

Still, silk has managed to hold on and many manufacturers believe the long-term outlook is much more encouraging than the immediate situation would seem to suggest. Silk's reputation, they point out, is centuries old and based on an ageless elegance, incomparable beauty and an exotic atmosphere no other fiber can match.

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Professor McKenna Retires

By Ronald Wayne Rogers, T.M. '67

After forty-one years of faithful service to students and to our school, Professor A. E. McKenna has announced that he will retire at the end of this academic year. Clemson University will lose the services of a man who has dedicated much of his life to preparing young men to enter the textile industry.

A. E. McKenna was born on July 10, 1901 in Barrington, Rhode Island and later graduated from Barrington High School. He graduated from Rhode Island School of Design in 1922 and received his B.S. degree from Clemson in 1930 in Textile Engineering. In 1933 he received his M.S. degree from the University of Tennessee in Industrial Education. He was employed by Mount Hope Spinning Company and Warren Manufacturing Company, both located in Warren, Rhode Island.

In September of 1925, Professor McKenna came to Clemson in the Weaving and Designing Department. He became Associate Professor Weaving and Designing in September, 1927 and Professor of Weaving and Designing in June, 1943. On September 1, 1964, he became Senior Professor of Textiles, the position which he now holds.

Professor McKenna is a member of the Presbyterian Church, Phi Psi National Honorary Textile Fraternity, and the American Association of Textile Technology, Piedmont Chapter. He is also a member of the Living Arch Chapter No. 21, RAM Clemson Lodge 254, A.F.M., Society of Mayflower Decendents, and Iota Lambda Sigma. He is a director in the Oconee County Tuberculosis Association.

In 1931 Mr. McKenna married the former Ruth Wills. They have one daughter, Mrs. C. F. Parshall who lives in Kingsport, Tennessee. Mr. and Mrs. McKenna are very proud of their three grandchildren.

Mr. McKenna has written numerous magazine articles on cam, dobby, and Jacquard looms and leno weaving. He wrote the I.C.S. **Leno Weaving** book which is currently being used as a text book in WD 301 here at Clemson University.

We cannot go into all of Professor McKenna's achievements. We can only thank him for his dedication and service and wish him luck for the future, which he plans to spend much of at Edisto Beach. The Bobbin and Beaker Staff and the faculty and students of the School of Industrial Management and Textile Science salutes Professor A. E. McKenna.

Textile Automation -- And People

An Address by H. W. Close
President, the Springs Cotton Mills

I. INTRODUCTION

Throughout history, few trends have generated more discussion, more fears and more difference of opinion than the matter of automation.

Automation is nearly as old as Man. And, like Man, it is just now bursting into the Space Age. But Man still wonders about it.

When Man invented the wheel, Fred Flintstone probably warned, "It'll never sell."

Thousands of years later, when Man hooked an engine to a set of wheels, critics viewed the Horseless Carriage with disapproval and kept on making horse collars.

But automation has continued to progress over the centuries — and with it people have progressed. Machines and automated processes have freed Man from drudgery, long hours, wasted motion, and the limitations of bone and muscle.

And despite dire predictions that automation would make humans obsolete, **the critical search** in industry today is not for capable machines, which we can buy — but for **capable people.** Despite the recurrent warning that automation will destroy jobs and create unployment, we are faced today, in many areas of the nation, with a shortage of trained, or trainable people.

Oh, there are plenty of bodies — but bodies won't do. Today, industry needs, and must have, people with educational backgrounds and aptitudes that will enable them to use modern tools and machines and processes.

If you don't think that Man has progressed, along with automation, just listen to this list of office rules that was posted by one employer less than 100 years ago:

> "Employees will daily sweep floors, dust furniture and shelves.
>
> "Each day fill lamps, clean chimneys, and trim the wicks; wash the windows once a week.
>
> "Bring a bucket of water and a scuttle of coal for the day's business.
>
> "Make your pens carefully; you may whittle nibs to your individual taste.
>
> "The office will open daily at 7:00 a.m. and close at 8:00 p.m. daily, except on the Sabbath, on which day it will remain closed.
>
> "Men employees will be given an evening off each week for courting purposes, or two evenings a week if they go regularly to church.
>
> "Any employee who smokes Spanish cigars, uses liquor in any form, gets shaved in a barber shop, or frequents poolrooms, will give me good reason to suspect his worth, intentions, integrity and honesty.
>
> "The employee who has performed his labors faithfully and without fault for a period of five years, and who has been thrifty and attentive to religious duties, will be given an increase of five per day, provided a just return in profits of the business perimits it."

Well, I don't know how many of you are smoking Spanish cigars, but I'm pretty sure that no one is trimming the wicks and whittling nibs on coffee breaks these days. And those big things that secretaries lug to work are pocketbooks—not coal scuttles.

Automation, and people, are moving ahead without any question — and this is happening in the **textile industry** today at a pace that is difficult to grasp.

At least **10 new textile plants** are planned for the United States and Canada alone during the first six months of 1966. More than **two dozen new textile plants** have been announced, or have gone into production, in the last 18 months. Textile machinery makers have order backlogs ranging from a year to a year and a half.

The U. S. textile industry is expected to spend more than **$1 billion** during 1965 for new plants, modernizations, and new equipment. That compares with **$228 million** just seven seven years ago. Last year, the figure was $760 million.

With this trend to modernization and automation, the number of jobs in the textile industry has increased, instead of shrinking. Today, the industry employs more than **925,000 people** — compared with 895,000 people in 1963.

And these people are working in a textile industry that is more efficient, more flexible, more streamlined, more responsive to consumer needs—and more profitable — than ever before. With such changes have come greater job security, better working conditions and higher wages for textile employees.

(Continued on page 10)

NATURAL BLEACHED
DYED
COTTON YARNS

PIEDMONT PROCESSING COMPANY
Belmont, N. C.

A Symbol of Satisfaction

THIS TRIANGLE, a mark of distinction, guarantees dyed and bleached yarns with superior knitting and weaving qualities. Wherever you see THIS TRIANGLE, you can be sure that quality fabrics are being produced.

Substantial investments in modernization and expansion projects in recent years have resulted in increased sales of yarns produced at this plant.

The continued growth of Piedmont is ample proof that modernization is imperative in today's competitive markets.

GASTON COUNTY

Gaston County Dyeing Machine Co.

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TEXTILE AUTOMATION — AND PEOPLE

(Continued from page 8)

II. OLD AND NEW — IN PICTURES

Let's look at some "BEFORE" and "AFTER" pictures — just to get an idea of some of the changes that have been taking place in the textile industry.

1. Old plant—and—New plant.
2. Old "cotton warehouse"—and—New cotton warehouses.
3. Old "power plant"—and—New power plant.
4. Old loom—and—New shutterless loom.
5. Old materials handling—and—New materials handling.
6. Old paper handling—and—New paper handling.

III. DEFINITION

The toughest problem in discussing textile automation is to agree on a definition of the word. It seems to mean different things to different people. Someone has said it's as hard for a businessman to define automation as it is for a preacher to define sin.

I won't go into a definition of sin. That seems to mean different things to different people, too. And instead of trying to define **textile automation,** I'm going to divide it into four general categories and cover each one lightly. These categories are:

— Mechanical automation
— Materials handling automation
— Process automation
— And plant automation

Let's take them one at a time:

(1) **MECHANICAL AUTOMATION** is the use of machines to do things formerly done by hand. The textile industry got into this business with power-driven machinery almost 200 years ago. Gradually, it developed a number of machines to process cotton and other fibers.

But for well over a century after this, mechanical automation remained painfully static. There were improvements, but they weren't earth-shattering. Even machine speeds increased surprisingly little.

In the 100 years from 1850 to 1950, for example, spinning spindles increased in speed from 6,000 revolutions per minute to less than 10,000 revolutions per minute. That's pretty slow progress.

A real break-through in machine speeds and efficiency came a few years after **World War Two.** And in the years since 1948 we **HAVE** seen great changes.

In those 17 years, the speeds of drawing frames and cards multiplied five times and the speeds of roving frames, winders, quillers and slashers at least doubled. In fact, cards now are running experimentally at **10 times** the speeds possible in 1948.

In the same 17 years, the speed of spinning frames and conventional looms increased 70 per cent. And shuttleless looms were developed which are doubling the speed of conventional looms. The shutterless looms have filling yarn cones that will last a full eight-hour shift.

Such improvements in machinery have brought about tremendous gains in plant efficiency and the productivity of employees.

FOR EXAMPLE, in Springs we recently converted our big Lancaster Plant from regular cards to high-speed cards. The change eliminated about 1,000 cards, leaving 110,000 square feet of vacant floor space.

In that space we built a $5 million combed cloth unit with 23,800 spindles and 405 looms. The unit employs 176 persons — and these are NEWLY-CREATED jobs.

Let's take an INDUSTRY-WIDE example of higher productivity brought on by mechanical automation:

In **1954, the cotton textile industry** alone had nearly 23 million spindles, almost 400,000 looms and about 296,000 employees. The industry produced 10 billion, 892 million square yards of cotton cloth that year.

In **1964,** ten years later, the cotton textile industry produced almost as much cloth (10 billion, 754 million square yards) with nearly 3½ million FEWER spindles, about 100,000 FEWER looms and with 63,000 FEWER employees.

Some of these 63,000 people, incidentally, now are employed in the expanding synthetic textile industry.

As you can see, in 1813 it took 12 plants with more than 246,000 spindles to equal the production of one 20,000 spindle plant of today. By 1850, it took 4½ plants with about 90,000 total spindles to equal the output of a 20,000 spindle plant of today. By 1900, this was down to 2¼ plants with about 46,000 spindles, and by 1920 it was down to 2 plants with a total of 40,000 spindles.

By 1940, 1¾ plants with a total of about 33,000 spindles were needed to equal a 20,000 spindle plant of today. By 1950, this was down to 1½ plants. And in 1960 a plant of 28,440 spindles was needed to equal the production of a 20,000 spindle plant of today.

This gives you some idea of the rapid changes now taking place in the industry.

(2) **MATERIALS HANDLING AUTOMATION** has been coming along fast in the textile industry — but only in recent years. It saves money because it reduces the amount of hand labor needed to move things from one place to another.

Most textile plants of 50 to 100 years ago were built three or four stories high. Bobbins, quills, cheeses (POINT THEM OUT) and other things had to be carted in boxes by hand from one floor to another, or from one part of a floor to another part. This was time-consuming and inefficient.

TODAY, plant design and materials handling systems eliminate most of these tedious, unproductive hauling chores. New plants are one story high. Machinery is laid out for a straight-through flow of stock from one manufacturing step to the next. Theres no need to haul materials great distances.

For example, here's a chart showing material flow through our new Elliott Plant, which gives you an idea of how today's plants are being built. It's important to note that not a single person is employed in this plant to haul materials from one place to another. Notice how the cotton bales arrive at this end of the plant and move straight into opening and picking. The cotton moves by conveyor to carding, and then, in a straight-through pattern, the stock moves to drawing, lap machines, combers, finisher drawing, roving frames, spinning, yarn preparation, weaving, cloth inspection and then out the other end of the plant and to the bleachery.

To take care of the movement of materials, modern textile plants now have **automatic conveyor systems.**

For example, in our new Elliott and Frances Plants, our engineers developed an automatic system to convey laps of cotton from the pickers to the cards.

In addition, automatic equipment has been developed that will remove full bobbins or roving or yarn and replace them with empty bobbins.

Still other automatic equipment includes automatic cleaning systems which remove lint by means of blowers and suction.

(3) **PROCESS AUTOMATION** is the type of automation that I believe most people think of when they talk about automation in the textile industry. This **highly promising** area is just developing in textiles, although it's fairly common in some other industries.

Process automation involves automatic control of manufacturing operations **AND** mechanical or electronic feedback of information. A mechanism tells a machine what to do, and the feedback checks to see that the machine followed orders. If the feedback finds an error, it makes adjustments to correct the error.

The system makes it possible to link certain groups of manufacturing steps in **ONE CONTINUOUS FLOW.** Automatic controls and feedback provide careful regulation. The result is improved quality control, higher quality, better uniformity, and greater efficiency.

An example of this is a continuous process which starts with a bale of cotton and winds up with breaker drawing sliver. In contrast, the conventional production method uses four separate processes — opening and blending, picking, carding and breaker drawing.

Other automatic processes are being developed, too —such as **continuous automatic spinning.** This system takes cotton from the bale to the yarn in one continuous flow.

This has been called a system in which the fiber is "untouched by human hand," but that's not quite true.

Continuous automatic spinning was developed in Japan. It's in use now in several mills in **that** country.

Today, there are a number of bale-to-sliver automated systems on the market, and at least 10 established sliver-to-yarn systems are being offered. In addition, many separate pieces of machinery now are being produced that are highly automated in themselves and capable of high speeds. And systems are being developed that completely eliminate production steps.

Incidentally, finishing plants are far more advanced than are grey mills in continuous flow production. Our Grace Bleachery, near Lancaster, has been using continuous process bleaching and dyeing since the plant was built in 1948.

(4) Now, let's look at **PLANT AUTOMATION:**

An important factor affecting the successful use of all other textile developments is the construction of well-engineered, modern plants with **built-in automatic** controls.

Old plants presented a problem—and still do, since many are still in use. In fact, despite the rapid pace of modernization, a majority of the textile plants in use today are old plants. Temperature and humidity control in these older plants is inadequate, for the most part. Old plants cannot be refrigerated effectively and there is no control of air flow.

In contrast, new textile plants have precise automatic control of temperature, air flow, and humidity thorugh refrigeration and air conditioning.

(5) **PAPER AUTOMATION**

There's one final area in which the textile industry is automating — the old Army game of shuffling papers. Key punch operators, programmers and technicians have taken the place of the batteries of typists, clerks and bookkeepers formerly needed to handle the immense volume of paper work existing in any large company.

V. ECONOMIC FACTORS

(Continued on page 12)

TEXTILE AUTOMATION — AND PEOPLE

(Continued from page 11)

Just about all large textile companies now use **automatic data processing** to do their paper work. In **Springs**, we have been using automatic data processing since 1957. Our computers perform more than 2,000 different jobs. We are now in the process of phasing in two new high speed third generation computers.

Data processing gives us, and other companies, capabilities we could not achieve otherwise. For example, we can compute our payroll for 16,000 employees in less than 15 minutes. And our pay checks are printed out automatically at the rate of 285 per minute. It would take **225 typists to match that speed.**

IV. WHY AUTOMATE?

Why is it necessary to automate in the textile industry?

There are many reasons. Here are a few of them:

(1) We must increase our capacity to produce, despite an increasingly **SHORT SUPPLY OF LABOR** —especially skilled labor.

(2) We must increase our efficiency in order to meet **COMPETITION AT HOME AND ABROAD.**

(3) We must reduce our costs per unit produced in order to **HOLD PRICES** at levels that are competitive.

(4) We must find ways to **INCREASE OUR PROFITS** in order to **MEET RISING COSTS**, and in order to **ATTRACT MORE INVESTMENT CAPITAL.**

(5) We must speed up our production to **SATISFY A MARKET** that demands service, flexibility, faster deliveries and swifter style changes.

Although there is a definite trend toward automation in the textile industry, it is not a simple matter of shelling out the money and buying yourself a completely auomated operation. The manufacturer must consider many economic factors.

Here are just a few of them:

(1) How much will it cost me to automate? Automated systems cost an estimated 25 per cent more than conventional production machinery. Will the profit return justify the additional investment? (Textile manufacturers averaged a profit of 8.5 per cent on their investment in 1964, compared with 11.6 per cent for all manufacturing industries. On the basis of sales, textile manufacturers made a profit of 3.1 per cent in 1964, compared with 5.2 per cent for all manufacturing industries.)

(2) How long can the equipment in question be run before other technological advances will make it obsolete? This is a **critical factor.** In the old days, machinery could be run until it wore out. Today, machinery must be replaced when it can no longer compete with something newer, faster, and more efficient. This means getting rid of machinery that has many more years of life left in it — too many times even before we've paid for the original investment.

(3) Can the equipment be run fully? Automatic equipment must be run full-time, 24 hours a day, in order to pay out.

(4) Is there a sufficient local supply of skilled labor and technicians to staff an automated operation? This may become a serious problem unless technical training is expanded. Skilled technical people already are hard to find.

VI. STATUS OF AUTOMATION TODAY

The trend toward automation in the textile industry offers a combination of great advances and stern challenges.

As the industry continues to consolidate, the leading companies must become larger so that they will be able to take advantage of automation.

This will help the large companies, but it will place the smaller companies and the less efficient companies under even heavier competition. Many will not survive. They will either go out of business or be absorbed by the larger companies. This will tend to eliminate over-capacity and to create a more stable industry.

While automation offers the opportunity for great advances, it is costly and companies will need to budget increasing amounts for capital expenditure. Around 1900, the cost of building a new plant was about $1,300 per employee. Older plants in operation today represent an investment of $6,000 to $10,000 per employee. New plants of the last two or three years represent an investment of $30,000 to $35,000 per employee. One plant now under construction will represent an investment of $50,000 per employee. Another, with a high degree of automation, will exceed even this figure. To afford such an investment, companies must be strongly capitalized.

For strong, well-managed companies, able to keep pace with changing technology, the outlook is good. Automation should mean more efficient use of plant space, greater productivity per employee, lower unit costs, greater speed of production, higher quality — and higher profits.

These gains will give the U. S. textile industry a greater ability to compete with foreign manufacturers, since the differential of cheap foreign labor will become a smaller factor.

From an industry-wide point of view, textile automation probably will mean fewer textile employees in the long run. No one can say how many jobs will be affected, but it is only common sense to recognize that better plants, more automated processes and more efficient methods eventually will enable fewer people to produce more goods.

But the textile industry will not move toward automation without serious concern for the people whose jobs may be eliminated.

A public opinion survey showed recently that in the South, where the textile industry is concentrated, 35 per cent of the people feel that large companies make a genuine effort to avoid hardship on workers whose jobs might be eliminated by automation. The percentage should be increased, because it's true. Companies **are** trying to avoid hardship to employees.

The stronger textile companies will go considerably beyond this. They will protect the jobs of their employees, and create job opportunities for new employees, by becoming more efficient, more diversified, and more competitive — producting **GROWTH.** People with job skills and technical abilities will be in particular demand. Frankly, it is the **UNSKILLED** who will lose out.

I can tell you that Springs has moved in this direction. Our decisions on when and where and how to modernize have been influenced by our concern for our people. And I am glad to say that modernization has enabled us to grow. In the last three years, we have built or started work on five new plants, and we have modernized a half-dozen older plants.

This has made it possible for us to **create 2,000 additional jobs** in our company in three years. In that time, we have spent or committed more than $85 million for modernization and new plants.

The combination of all of the factors I have mentioned will bring **RISING STATUS** to the textile industry and to the textile employee. And the stronger textile industry that will result will be able to **PAY TEXTILE EMPLOYEES HIGHER WAGES** — a point of great significance in the textile South.

Such a forecast as this can only be viewed as a very long-range outlook. The staggering cost of a massive transformation of one of the nation's largest industries cannot be borne in a short span of time.

But **AUTOMATION IS COMING** — and with it will come brighter prospects for the textile industry and textile employees.

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MAURICE GOLDEMBERG

by Eugene A. Deladdy, I.M '67

As the 1965-66 school year comes to a close, Clemson University will lose the services of a man dedicated much of his life to the textile industry. Professor Maurice Goldemberg has announced his plans for retirement after an outstanding service record of thirty-eight years in textiles and textile research.

Born in 1901, in Paris, France, Professor Goldemberg attended grade school and high school in Paris. In 1921, he received his degree in Chemical Engineering from the National School of Advanced Chemistry in Paris, and his M.S. degree from Sorbonne University in Paris, France.

Beginning in 1921, he served in the Chemical Corps of the French Army for two years. After discharge from the army, he came to the United States in 1924.

He served as head of the Analytical lab of United Piece Dye Works of Lodi, New Jersey, from 1924 to 1928. From 1928 to 1936 he was in charge of Development in the Wrighting Department of U. P. D. W. of New Jersey. In 1936 he became a Research chemist for Sunbury Converting Works as the Plant Chemist. In 1946 he was made Technical Director of the Dyehouse of U. P. D. W. of New Jersey, and in 1951 Mr. Goldemberg moved to the United Piece Dye Works plant in Charleston, South Carolina, to serve as the Director of the Dyehouse and Laboratory.

Mr. Goldemberg came to Clemson in 1959 to serve as associate professor in the Textile Chemistry department of the School of Industrial Management and Textile Science. He is a member of the American Chemical Society, the American Association of Textile Chemists and Colorists, the French Engineers in the United States, and The American Association of University Professors. He has served as a member of the Research Faculty Council here at Clemson, and also as advisor to the Clemson University Hillel Club.

Professor Goldemberg is married to the former Lisette Grimberg, an accomplished pianist. They have two children. The Goldembergs attend the Temple of Israel in Greenville, South Carolina.

After retirement, Professor Goldemberg plans to reside in Clemson but plans to do a great deal of traveling both in the United States and abroad.

The Bobbin and Beaker staff would like to extend to you, Maurice Goldemberg, the very best of luck.

A Better Situation for Fibers

A fiber supply situation without much of the uncertainty of the past decade is shaping up for the American textile industry.

President Johnson's acceptance of a new farm bill on November 3 insured that the industry would be able to purchase American-grown cotton under a one-price system for the next four years. The one-price system provides cotton to American mills at the same price it is sold overseas.

In addition, production capacity of the man-made fibers industry continues to grow, with predictions of a 40 per cent increase in output in the next five years. Man-made fibers accounted for more than 40 per cent of all fibers consumed by the S. C. textile industry in 1964, the highest percentage ever recorded.

Cotton consumption during the 1964-1965 crop year which ended July 31 was the highest since the 1955-1956 crop year, with 9,170,865 bales being used. Although the mills' use of cotton was up sharply, cotton accounted for only 54.5 per cent of all textile fibers used by U. S. mills. That percentage is the lowest since the invention of the cotton gin.

The fiber supply situation is an important element in the textile industry's competitive position.

The growth of the man-made fiber industry and the continuing refinement of individual fibers such as rayon, acetate and nylon, plus the development of other fibers, increases the need for utmost quality in natural fibers such as cotton and wool. As the fibers themselves improve, there is a corresponding increase in the potential for new, different and better yarns and fabrics.

Recent industry developments such as stretch fabrics and durable or permanent press finishes have been made possible because of the availability of high quality fibers at reasonable prices. Both quality and price are necessary because of the extra finishing operations which mean added production costs.

As more and better products are turned out, the U. S. textile industry is in a better position to hold its traditional markets and to build new ones against the pressures of both foreign-made textiles and domestically produced non-textile products.

The textile industry's record in the face of all these pressures has been an enviable one. Wholesale prices for textiles generally have dropped about 10 per cent in the last 15 years while wholesale prices for other industrial commodities have increased almost 30 per cent. In addition, textile wages are at a record level and the industry is operating at almost full capacity.

Behind the healthy economic position, however, is the fundamental ability of the industry to purchase its raw material — its raw fibers, both natural and man-made — in a market more free of unnatural pressures than at any time since the middle 1950's.

Courses for Professional Development - 1966

The School of Industrial Management and Textile Science series of Professional Development courses for this summer will be:

May 23 through 27

P.D. 96—Color Measurement Seminar

May 30 through June 3

P.D. 22—Introduction to Textile Manufacturing, and Finishing

May 30 through June 10

P.D. 25—Yarn Manufacturing
P.D. 41—Methods Analysis and Time Study
P.D. 43—Basic Textile Chemistry
P.D. 47—Quality Control
P.D. 84—Technical Report Writing and Communications

June 20 through 24

P.D. 79—Graduate Seminar in Industrial Administration (Session 1*)

June 20 through July 1

P.D. 25—Yarn Manufacturing (A repeat of May 30-June 10)
P.D. 38—Supervisor Development
P.D. 41—Methods Analysis and Time Study (A repeat of May 30-June 10)
P.D. 44—Advanced Textile Chemistry
P.D. 56—Weaving: Fabric Design and Development

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*A person may enroll in either Session 1 or Session 2, or both.

This summer will mark the ninth year of the Professional Development program, designed to keep persons in industry abreast with advancement in science, technology, and Management.

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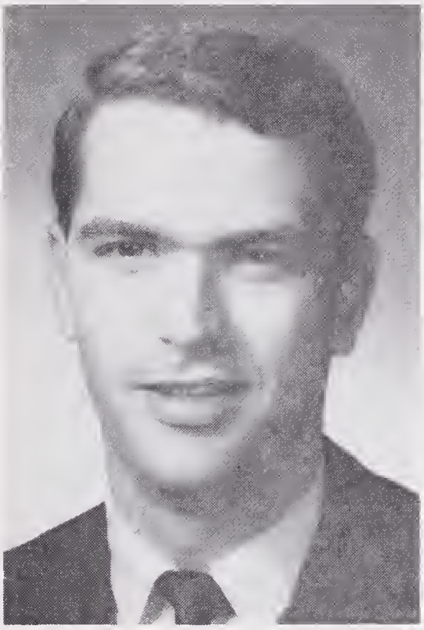


ARCHIE L. HARMAN

Archie L. Harman is a twenty-one year old Industrial Management major from Lexington, South Carolina. He has received scholastic honors for his last six semesters at Clemson.

On campus he has been active in several organizations including Iota Mu Sigma, the honor society for Industrial Management majors, and Kappa Delta Chi social fraternity. His main interest is in politics, and while at Clemson he has helped organize and has served as president of Clemson University's Young Democrats. Archie has also been active in student government serving as a Junior and a Senior Senator. He is now chairman of the Senate's General Affairs committee and has served as a delegate for Clemson to the South Carolina student legislature for the past two years. He is also a defense attorney for Clemson's High Court.

Archie has worked as a page in the United States Senate and with a law firm in Columbia. After graduation he plans to attend Law School at the University of South Carolina.

W. RYAN HOVIS

Ryan Hovis is a twenty-three year native of Rock Hill, South Carolina. He is majoring in Textile Chemistry and has received an Allied Chemical Foundation Scholarship to help with his expenses.

On campus Ryan is a member of Phi-Psi honorary textile fraternity and the York County Clemson Club. Last year he served on the Junior staff of the Tiger and also the Junior staff of the Taps.

Ryan gained valuable experience before coming to Clemson while working for two years full time in the Research Laboratory at Rock Hill Printing and Finishing. He also works there in the summer.

Ryan plans to attend graduate school after graduation but as yet he has not decided upon the institution.

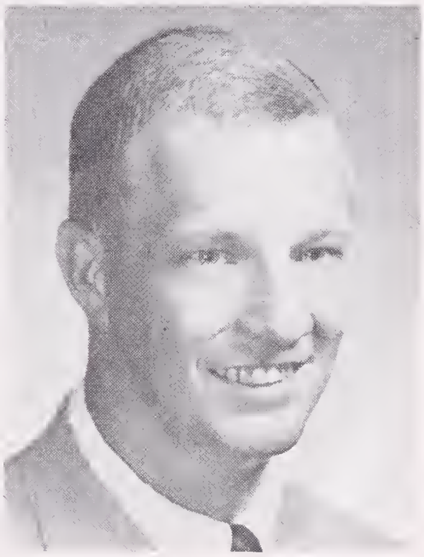
MILTON K. COBB

Milton Kinsier Cobb is a twenty-two year old Textile Science major from Cleveland, Tennessee. He is married to the former Eva Hay of Cleveland.

Kin was a member of the American Association of Textile Technology and is serving as program chairman for this year. During Kin's stay at Clemson, he has been active in intramural sports.

Kin has gained valuable experience in the textile industry by working during summers. He has spent three summers working at Cleveland Woolens Division of Burlington, Inc. in the yarn control department, cloth room, dressing, stock dye, supply room, and blending and waste house. He has worked one summer at Gerrish-Milliken in the weave room.

After graduation, Kin plans to accept a position with either Beaunit Fibers or Burlington Industries, Inc.



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For Everything There is a Season

Frank A. Burtner
Professor of Sociology, Clemson University

The demise of an human being, or an organization, presupposes a beginning, and so it may be recorded that THE BOBBIN AND BEAKER was conceived in November 1939, as a spring semester project of Phi Psi, National Textile Fraternity. As with all organizations, the precise date of conception is no more than a concession to accounting, for as the editor of Volume I, Number 1, observed, "How long the idea of a textile magazine remained in the back of somebody's mind will probably never be known."

While the exact date of conception and the period of gestation were indefinite, the date of birth and formal statement of purpose were, on the contrary, quite certain. The first issue of THE BOBBIN AND BEAKER, Official Textile Student Publication of Clemson A & M College, donned its swaddling clothes in March, 1940, and proceeded to the accomplishment of its purpose, that purpose being, as stated by the original editor, ". . . to deal with the interdependence of the textile school and the industry, and to maintain contact with the textile school graduate." Further amplification of this purpose and some indication of its means of attainment are to be found on "The Editors Page" of the initial issue: "THE BOBBIN AND BEAKER tries to cover all phases of the textile industry . . . As students we can write only in general terms, or correlate reading material. It is up to the readers in the plants to give us the technical articles and discussions that will be the life of the magazine." With these statements of means and ends, two thousand copies of the magazine were distributed to textile plants in North and South Carolina, one thousand to students, alumni, and friends, and two hundred at the 37th Phi Psi Convention in Philadelphia. And thus, and again according to the editor, "the first college magazine in the South" found its way into the world.

First or last born ventures in 1940, the health of the newborn notwithstanding, emerged into an uneasy environment destined to disintegrate rapidly into hostility. After four years, the fifth issue of THE BOBBIN AND BEAKER, April, 1943, announced the suspension of publication "for the duration of the present war." This same issue announced the resignation of H. H. Willis as Dean of the School of Textiles and appointment of R. K. Eaton as Acting Dean. In tune with the times was the "Guest Editorial" entitled, "Planning For Peace," by W. M. McLaurine, Secretary and Treasurer, American Cotton Manufacturers Association, a description of a poster advertising Cotton Week bearing the slogan, "Cotton Fights On Every Front," suggested by Col. Robert T. Stevens, and an explanation and photograph of the Phi Psi Service Flag.

Publication of THE BOBBIN AND BEAKER was not resumed until January, 1947, two years after the appointment of H. M. Brown as Dean of the School of Textiles and Head of the Textile Management Department. An uninitiated staff had its problems, and the solution seemed to lie in continuation of the original purpose and format of the magazine: "Guest Editorials" by men prominent in the textile industry, reports on research by members of the Textile School staff, articles emphasizing the economic and human relations aspects of the industry by staff members of other Schools within the College, reprints from professional textile journals, Phi Psi News, Textile School Faculty Notes, news of alumni, and occasional reports of new developments within the industry.

While the resumption of publication was auspicious, made so by booming enrolment occasioned by returning veterans, the fortunes of THE BOBBIN AND BEAKER soon began to reflect the changing environment of Clemson's academic community. Student participation waned markedly less than ten years after resumption of publication, and this trend continued to the present. Under these circumstances, the magazine became, in substance, a forum for reports and articles by members of the faculty with occasional contributions by men in industry, plus a miscellaney, largely personal in nature, concerning students and various campus activities. The valiant effort to measure up to its original aims continued with the appointment of Gaston Gage as Dean of the School of Textiles but, except for a dedicated hardcore of Textile majors, student participation in publication continued its steep descent. This trend became even more pronounced with the merging of the Department of Industrial Management and the School of Textiles and, with the retirement of Gaston Gage and the appointment of W. D. Trevillian as Dean of the School of Industrial Management and Textile Science, THE BOBBIN AND BEAKER as-

(Continued on page 20)

FOR EVERYTHING THERE IS A SEASON

(Continued from page 19)

sumed a managerial and professional, rather than technical, complexion. In this context, student participation was further disadvantaged and limited to summary reports on undergraduate research, largely in the field of management. THE BOBBIN AND BEAKER, essentially a student publication was constantly plagued with financial deficits and under changed circumstances, no longer found it possible to live up to its original aims.

Within the span of its period of publication, THE BOBBIN AND BEAKER took note of a number of events, trends, and personalities, a random sampling of which would include: the death of President E. W. Sikes, . . . the Government Cotton Spinning Laboratory . . . Textiles in the war effort . . . Deering Milliken Research Trust . . . Japanese textiles . . . Textiles through the microscope . . . Nylon as a textile fabric . . . American Society of Textile Engineers . . . Orlon . . . Expansion program of the School of Textiles . . . National Maid of Cotton visits Clemson . . . dedication of Sirrine Hall . . . N.T.M.S. and A.A.T.T.C. . . . In Memoriam: Prof. W. G. Blair . . . Ramie . . . an address by Dr. Ellison S. McKissick . . . establishment of a Cotton Ginning Laboratory . . . stretch yarn developments . . . Textile School Gets Coed . . . woolen industry comes South . . . the new Sirrine Library . . . graduate research in Textile Chemistry . . . Saco-Lowell Research Center . . . the use of electronic computers in the textile industry . . . the export challenge . . . Dan River celebrates 75th anniversary . . . Mills to battle U. S. policies . . . Quality control . . . Clemson delegates attend Fancourt Seminar courses for Professional Development . . . The Textile Comeback . . . The Industrial Management Society . . . Industrial Management Seminar Series.

As pointed out in an earlier connection, organizational goals, no matter how realistic originally, no matter how admirably achieved, inevitably find themselves unfitted to changed needs and situations. It is axiomatic that organizational goals must be in tune with their environment, else the organization falters, stagnates, eventually dies. For an extensive period of its existence, THE BOBBIN AND BEAKER achieved its goal to serve as a medium of exchange between school and industry but, as textile technology has become increasingly complex and management more sophisticated, exchange has become predominantly a one-way affair. Professionalization in specialized areas and on managerial levels has made is impossible for the student equipped with only basic tools, limited experience, and a crowded curriculum to uphold his part of the intended dialogue.. Professional journals provide technical information and contact with graduates of the textile school are maintained through the Office of Alumni Affairs. In short, the projected goals of 1940 are ineffective in the changed environment of 1966.

And so 25 years, 68 issues, 27 editors, 10 faculty advisers, and 5 Deans later the terminal issue of THE BOBBIN AND BEAKER goes to press. Applause in appreciation for a job well done is in order for all those who have been associated with the magazine. Their place in the history of the Textile School is secure.

Editors, Faculty Advisers, and Deans under whose aegis THE BOBBIN AND BEAKER has been published:

Editors:

C. E. Anderson
W. R. O'Shields
G. E. Williams
E. D. Moore
M. D. Moore, Jr.
W. E. Broadwell
H. R. Valerius, Jr.
R. J. Cheatham, Jr.
B. K. Sutton
W. M. Kirby, Jr.
S. P. Morrah
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Ben Wilson
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C. E. Griffin, Jr.
W. W. Freed
Alan Bell
Tommy Ariail
R. E. Wall
W. E. Barrineau, Jr.
J. W. Blackwood
H. M. Poston
S. E. Goodman

Faculty Advisers:

H. H. Willis
M. D. Moore, Jr.
R. K. Eaton
A. E. McKenna
H. M. Brown
C. V. Wray
Gaston Gage
D. P. Thomson
W. D. Trevillian
D. R. Gentry
C. H. Whitehurst, Jr.

Deans:

H. H. Willis
R. K. Eaton
H. M. Brown
Gaston Gage
W. D. Trevillian

To the Editor and Mrs. Houx:

I have set the type for every issue of THE BOBBIN AND BEAKER over the years and I am truly sorry that it will not be published again. I shall miss it, I am sure.

Thanks to both of you for being so agreeable to work with. I wish each of you the best of everything.

(Mrs.) Jewel Lewallen

Industrial Management Undergraduate Research Abstracts

A Study of the Packing Job at Jacobs Manufacturing Company

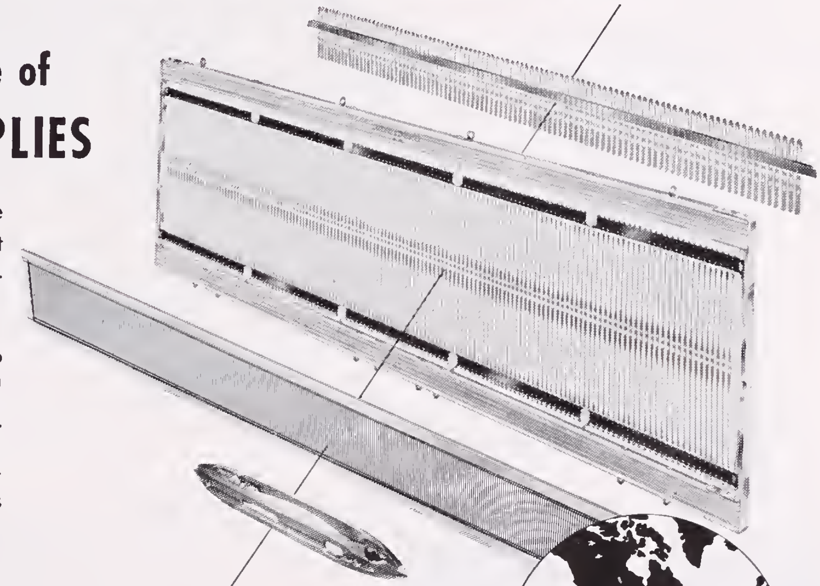
Reuben L. Parton and George J. Free

The Clemson plant of the Jacobs Manufacturing Company, a subsidiary of the Chicago Pneumatic Tool Company, is engaged in the assembly, inspection, packing, and shipping of drill press parts. The products consist mainly of arbors, chucks, keys, units, sleeves, and key holders. Workers in the assembly and inspection departments are paid on a production basis, but at present, workers in the packing department are paid on an hourly basis.

The purpose of this study was to determine if the packing for shipment job could be placed on an incentive, and, if so, to develop and propose such a plan. The job was analyzed by using various analysis techniques and broken down into fundamental elements. Standard times were found for each of the elements by using a stop-watch time study analysis. Standard times were found for each size shipping package used by the company, ranging from a "#0" shipping bag to a "#20-SHIPPER" box.

Because of the large number of variables present in the shipping job, the authors recommended a 50-50 Premium plan of wage payment, with a guaranteed minimum wage equal to the present hourly wage. This would have the effect of dempening the deviations caused by the variables. The formula for computing the wages was given, as well as a graphic representation of the wage structure.

It is the opinion of the authors that the packing job does not lend itself very readily to an incentive wage payment plan. However, we believe the basic structure of our plan is suitable to the job. Any flaws which might exist in the plan could very well be eliminated by a more extensive analysis using the same techniques and principles.



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TEXTILE FACTS

South Carolina

Geographical Range: 344 plants are located in 37 of the state's 46 counties.

* * * *

Employment and Payroll: Nearly 140,948 employees annually earn more than $460,270,287 representing 60.4 per cent of the state's industrial payroll.

* * * *

Value of Products: $2,381,374,524 for the fiscal year ending June 30, 1963, representing 57.3 per cent of the value of the state's industrial production.

* * * *

Productive Capacity: 6,954,478 spindles, accounting for 33.8 per cent of the nation's active spindles as of June 30, 1963; 153,879 looms; produced 1,039,000,000 linear yards of cotton broad-woven goods in the first quarter of 1963 to account for 41.9 per cent of the national total.

* * * *

Cotton Consumption: 2,592,614 bales of cotton during the 1962-63 crop year, or approximately 30.1 per cent of the total domestic consumption.

* * * *

About five of every six bales consumed in South Carolina mills come from other cotton growing states.

* * * *

South Carolina is now the nation's greatest producer of broad-woven goods. Its finishing plants process about 30 per cent of the nation's cotton yardage.

* * * *

The annual value of textile products in the Palmetto State has almost tripled since World War II and now approaches two billion dollars.

* * * *

The measurement of any textile industry is the number of active spindles and looms, and the production that comes off of them.

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